

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## Portable Engine by the Ames Iron Works.

Our illustration represents a portable engine suited to the wants of farmers, lumbermen, miners, cotton planters, contractors, and, in fact, anyone who desires a first-class engine mounted as a portable. A large number of them are annually sent to South America, and the demand for them there is constantly increasing. These engines are provided with every requisite in the way of pumps, gauges, safety valves, governors, gauge cocks, gauge glasses and spark arrester. In addition to the pump driven by the engine there is a hand pump by which the boiler may be filled when cold. The crank shaft has two band wheels, one on each side, which also take the place of fly wheels. The boiler is of the well known type used by the Ames Iron Works, which we have previously had occasion to describe. These engines are constructed on very strong trucks or running gear, having wood or iron wheels, as may be preferred. The boiler being placed under the end remote from the furnace, so that the bulk of the weight is placed upon the hind wheels of the truck, the axles of which are made from the very best refined hammered iron, while the hind axle is curved to the exact shape of the boiler at the fire box end, which gives an equal bearing to the parts attached, this not only gives extra strength, but prevents any local strain on the bearings or axle boxes. The boxes are manufactured from new designs. Brackets or "clips" are also bolted to the boiler, which are constructed to abut the shoulders of the axles, thus firmly bracing them against the effect of sudden trial or shock. A Salter spring balance is used on the safety valve instead of a weight. The smoke pipe is hinged, and provided with a spark arrester. The engine is also provided with a flexible suction pipe with rose strainer, an extra force pump for supplying the boiler while at rest, and a comfortable seat for the driver. Eleven different sizes of these engines are made, varying from 5 to 40 horse-power. The manufacturers are the Ames Iron Works, Oswego, N. Y. The office in New York city is at 38 Cortlandt street.

## The Siemens Patent in the United States.

We take the following from the Official Gazette of the United States Patent Office: C. W. SIEMENS.—*Interlocutory Appeal.*

[In the matter of the application of Charles W. Siemens for Letters Patent for "IMPROVEMENT IN THE MANUFACTURE OF IRON AND STEEL," filed August 11, 1876.—Decided June 7, 1877.]

The domestic application for an invention already patented abroad need not be restricted to precisely the same subject matter as the foreign grant.

It must, however, be divided if found to conflict with the rule respecting duplex applications.

If the domestic application is for the same subject matter as the foreign patent, with immaterial variations, the requirement that the patent granted shall be "limited to expire at the same time with the foreign patent" will be strictly followed, and the limitation be made directly upon the face of the instrument.

Where new features are introduced, and are in combination with those contained in the foreign patent, such limitation cannot be made; but in event separate claim is laid to matter set forth in the foreign patent, specific mention by date and number of such patent must be entered in the domestic specification.

A domestic application made up from a number of foreign patents will be divided for the purpose of restricting the term if the subjects matter separated are not properly in combination.

Section 4887, Revised Statutes, construed as an exception to Section 4884, with respect to the term of patent grants, and the language of the section, "so limited as to expire," held to require that the limitation shall appear upon the face of the patent. [C. S. Whitman, for applicant.]

DOOLITTLE, Acting Commissioner.

The question herein involved is substantially as follows:

Does our statute contemplate that a foreign patentee should, in making an application for a patent here embracing the same invention, restrict his American application to precisely the same subject matter covered by his foreign patent, subject, of course, to our rule requiring a division of the application should the foreign patent be duplex?

Section 4887 provides—

"No person shall be debarred from receiving a patent for his invention or discovery, nor shall any patent be declared invalid by reason of its having been first patented or caused to be patented in a foreign country, unless the same has been introduced into public use for more than two years prior to the application. But every patent granted for an invention which has been previously patented in a foreign country shall be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest term, and in no case shall it be in force more than 17 years."

The only restriction here placed upon the patent granted in this country for an invention patented abroad and not in previous use here for more than two years, is the limita-

tion as to the time of its duration. The requirement is not made that the American patent shall be restricted to the same matter covered by the foreign patent; and in view of the wide difference in the modes of examination, especially between England and this country, it would be entirely impracticable, in the majority of instances, to attempt to confine the American patent to the precise matter covered by the foreign patent.

Occasionally the same subject matter, with immaterial variations, will be included in the domestic application. In such cases the direction of the statute should be followed, and the patent "limited to expire at the same time with the foreign patent."

Where, in the domestic application, new features are added to those of the foreign patent, and in combination therewith, a limitation of the grant cannot be made; but at the same time in such case, as well as in all others of this class, specific mention should be required to be made in the domestic speci-

Thus, the sixth section of the act of 1839 provided that in all cases of this kind the domestic patent should be limited to the term of 14 years from the date of publication of such foreign letters patent. This proviso was amended by the operation of the sixteenth section of the act of 1861, to the extent that patents thereafter granted and embraced within such proviso should extend for the new term of 17 years from the date of the foreign patent. But the act of 1870 (and the revised statutes) provided that the American patent should expire at the same time with the foreign patent, and not in any case exceed a term of 17 years. (Weston vs. White, 9 Official Gazette, 1166.)

In restricting the grant in these cases, calculation should be made of the length of time the foreign patent has to run from the date of its issue here, and the limitation in the title be made accordingly.

To facilitate the proper restriction to be made in the grant where the domestic patent

pedo. But the extreme exactitude necessary to effect this result was such that it would be very difficult to calculate upon. To pass through three-quarters of a mile of still water the torpedo required about five minutes, during which it moved in a straight line at the same level, with constantly diminishing speed. If it were accurately aimed, disturbed by no cross current, projected from a stationary place of discharge, and the object aimed at did not move during the passage of the torpedo through the water, it would hit. These conditions of warfare could obviously not be realized. It was objected that the Whitehead torpedo was too costly to be fired at random, and that a combination of submarine movement and of the power of modifying or directing that movement from the point of discharge was required to make a locomotive torpedo a really formidable weapon. Such a combination was proposed by Captain Ericsson toward the close of the war of the rebellion,

feet in diameter. At each end it is conical in form, one cone, the after one being nine feet long and the forward cone four feet long. The forward cone contains the magazine, which may be 100 pounds of dynamite or any other explosive material selected, although dynamite is considered most available. The torpedo contains its own motor, is propelled by an engine and screw worked very much as a propeller is worked by steam. The motive power is a gas which is compressed, and which in escaping operates the engine. By means of a light cable, which is attached to the torpedo the engine is started and stopped at the will of the operator, and the rudder is used in the same manner. Three keys playing upon a battery on shore stop or start the engine, or turn the torpedo to port or starboard. Before starting, the torpedo may be arranged to explode by concussion or by electricity at the option of the person in charge. It may be launched from the side of a vessel by men, as it weighs but a ton, or can be lowered by davits. It is ballasted to sink two or three feet below the surface, as needed, and when submerged it can be traced in its course by means of two rods which project slightly above the water. It is claimed that in experiments already made with it it has been found possible to direct it accurately to a small object three miles distant from the point of its departure. It can travel at the rate of 12 miles an hour for three miles, the experimental torpedo being limited by its size to the storage of gas sufficient to operate it only for that distance. Vessels which are protected with a netting would not be safe against attacks from a torpedo of this description. Having made a breach in the netting, a second torpedo could be directed precisely through the breach against the hull, where the charge of dynamite could be discharged with terrible effect. An exhibition of the torpedo was given at Cleveland, Ohio, on Monday, when a stake boat or buoy was anchored three-quarters of a mile from shore, and the torpedo sailed under water out to and around it, and a canister of gunpowder was discharged by means of the battery on shore, to show the manner of using the weapon. The engine has already been examined by one of the belligerent powers, and 100 of them will soon be shipped to Europe. It remains to be seen whether, in actual warfare, its usefulness will be as great as is anticipated by its inventors that it will be.

**Separation of Arsenic from Cobalt and Nickel.**—Most of the common ores of nickel and cobalt contain a considerable quantity of arsenic, and perhaps on this account the crude metallic arsenic is sold in drug stores under the name of "cobalt." The usual method of dissolving the ore, and precipitating the arsenic by sulphureted hydrogen, is objectionable on account of the disagreeable odor and poisonous properties of this gas. Professor Wohler avoids this inconvenience by the use of oxalic acid. The ore, *Kupfer nickel* or *speiss cobalt*, is dissolved in aqua regia, evaporated, if necessary, so as to expel the excess of acid, and precipitated while boiling hot with carbonate of soda. After washing, the still moist precipitate is treated with an excess of a concentrated solution of oxalic acid. Both metals are thus converted into oxalates, while the arsenic acid goes into solution along with the oxide of iron. The mixture of nickel and cobalt oxalate is thoroughly washed, and may be separated by ammonia according to Langier's process. If the ore contains copper, it should be precipitated by means of finely divided metallic iron that has been reduced by hydrogen. The dissolving iron must afterward be oxidized to a ferric salt. Speiss cobalt can be deprived of a large portion of its arsenic by previous fusion, care being taken to conduct the operation in such a manner as to prevent injury from the poisonous white arsenious acid evolved.

**Cresosoted Timber.**—The Boston Post says: Mr. Edward B. Andrews, of this city, has leased a large tract of land in South Boston for the purpose of erecting thereon works for creosoting lumber. Wood whose pores have been thoroughly impregnated with creosote will never decay. The treatment with creosote was attempted in Boston some years ago, but the works were insufficient for the purpose. Yet the timber creosoted at that time, although imperfectly treated, has in most cases given satisfaction, and is to-day, after five or six years' test, perfectly sound, as can be seen in a part of the wooden pavement on Columbus avenue. At the French Exposition of 1867 sleepers were exhibited which had been in wear on English roads since 1838, and yet were perfectly sound. The principal tank or receiver in which the wood is to be treated is to be one-half inch iron, cylinder 100 feet long, 6 feet diameter, and warranted to stand a working pressure of 200 pounds to the square inch. The receiver will hold nearly 26,000 feet of lumber. The works will be completed about August 1.

The mechanic should not try to make, or have made, tools out of old files. They generally cost more than they are worth. If he is going to make a tool he should buy a good piece of steel of the proper shape, and the time and labor saved and the quality of the tool will more than make up for the cost of the material. In general, when a tool can be bought already made it is better to do so than to have it made. This is especially true of tools in common use.



PORTABLE ENGINE BY THE AMES IRON WORKS.

fications, if the matter is separately claimed, of the part patented abroad, particular reference being had to the date and number of said foreign patent. Where the proper restriction in the grant can be accomplished by a division of an application which may be composed of several foreign patents of different dates, such division should be required where the subjects matter of the separate foreign patents are not used to form a combination in the domestic application.

Section 4887 must be regarded as establishing an exception to the requirement of Section 4884, providing that every patent should be for the term of 17 years. The act of 1870 did not require, in terms, a limitation of the grant, but simply provided that the domestic patent should expire at the same time with the foreign patent granted for the same invention. But the revised statutes, in requiring that the domestic patent "shall be so limited as to expire," &c., seems to imply that the limitation shall appear upon its face.

It may be contended, as was held in the O'Reilly and Morse case (15th How.), that a patent not so limited on its face would not necessarily be invalid, although not exempt from the operation of the statute; still, as the present statute is mandatory in its terms, and its object is the protection of the American public by giving to it a foreign invention no longer monopolized abroad, it is deemed the duty of the office in all practical cases to comply strictly with the letter of the law and make the limitation in the grant.

It has been held, also, that the act of 1870 introduced a new principle as to this matter,

is to be limited, examiners should enter on the file wrapper, upon the allowance of a patent, the fact that a foreign patent has been granted, and the date of the same, or, if more than one, the date of the earliest to expire.

The case in hand will be disposed of in accordance with the above suggestions.

## A New Submarine Torpedo.

The outbreak of the war between Russia and Turkey stimulated to a wonderful degree the ingenuity of men whose minds had been turned to the construction of weapons offensive and defensive, but it has been particularly fruitful of designs and models of instruments for harbor warfare. In England the subject of torpedo defenses for the protection of harbors has been at no time neglected during the last ten years, and several very valuable discoveries have been the result of experiments by private persons and by the officers of the government. The topic has been a fruitful one for the newspapers. A short time ago one of the leading London journals, in referring to an article on submarine warfare, in a New York paper, spoke of some of the requirements that were still lacking in the best torpedoes. There seemed to be little to ask for in the way of fixed torpedoes. The submarine fish torpedo was spoken of as one which had reached great perfection, and there appeared to be no doubt that under favorable circumstances it could be so handled as to destroy a ship at a distance of half a mile or somewhat more from the point of discharge of the tor-

pedo was constructed by him which was driven from the shore by compressed air communicated through a hollow cable. It was found that in practice the speed of the missile was much diminished by the friction of the cable which the torpedo towed, but that defect was greatly remedied by coiling the cable on a reel in the torpedo itself, so that it payed out as the torpedo moved forward.

In the meantime a new torpedo has been constructed which combines many qualities required, and which will, if it fulfills all the expectations of its inventor, prove one of the most terrible and valuable engines of war ever introduced. It is a movable torpedo, the invention of Mr. John L. Lay, of Buffalo, N. Y. He has devoted more or less of the past ten years to its development and perfection. He invented and used some of the most effective torpedoes employed in the navy during the rebellion, among them being the spar torpedo, with which Lieutenant Cushing attacked and sunk the rebel ram Albatross in Roanoke Inlet. This torpedo was operated from a launch from which it was run out against the ram; the spar was then withdrawn and the launch backed away. He sold another torpedo to the United States government three or four years ago, which is highly approved, and again he finished one last year, which was tried in the Potomac River, and it was made the subject of a report by a committee of naval officers, who pronounced it the best in use. The perfected torpedo is constructed of iron or steel, in three sections. The middle section is a straight one, nine feet in length and two



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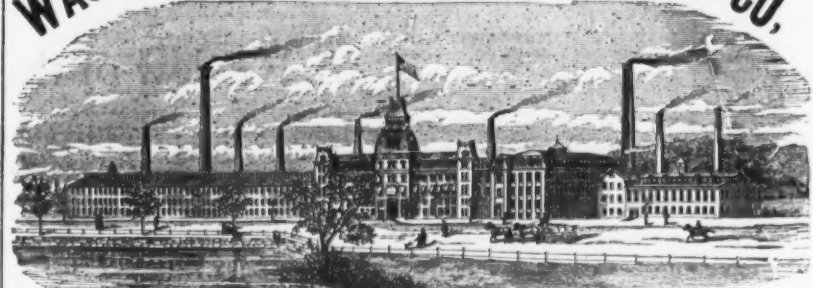


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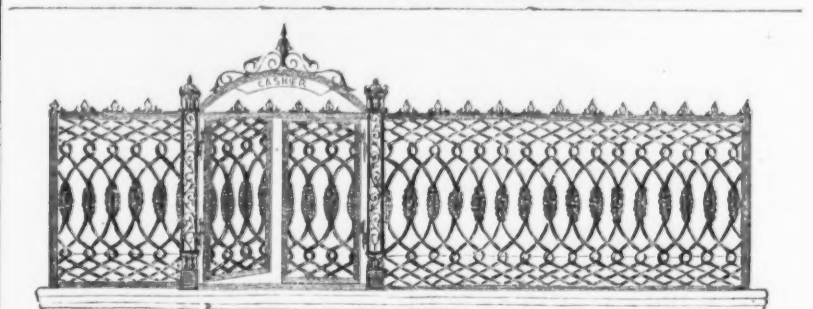
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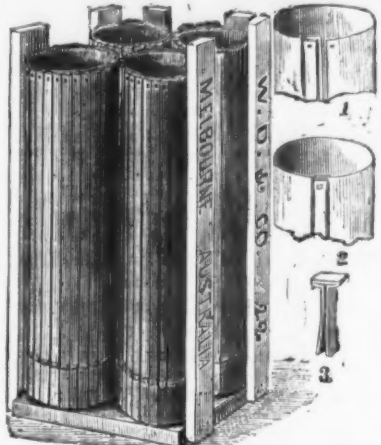
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lowest rates of freight. As it is entirely  
made by machinery, every joint is  
exactly alike, and fits together with  
the greatest accuracy and ease. A  
child can adjust it. No tools required,  
as it is complete and ready for use  
when boxed. When put together it  
forms the strongest and most perfect  
pipe in the world. Over each of the  
rolls is drawn one joint of pipe to  
protect the others from dirt and moisture,  
thus keeping it in perfect con-  
dition always. All who have tried it pronounce it "Perfection."  
The following are net cash prices, viz:  
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### Notes on the Iron Resources of Tennessee.

We have received from the Iron, Coal and  
Manufacturers' Association, of Chattanooga,  
a pamphlet on the agricultural and mineral  
wealth of Tennessee, by Col. J. B. Killebrew,  
from which we take the following:

From the most trustworthy information  
the iron production of Tennessee, charcoal  
and stonecoal, since 1871, is as follows:

	Charcoal.	Coal and Coke.	Total.
Tons.	Tons.	Tons.	
1872.....	34,094	8,360	42,454
1873.....	34,532	8,602	43,134
1874.....	37,227	11,543	48,770
1875.....	18,011	10,300	28,311

Number of stacks completed:  
1873..... 20  
1874..... 21  
1875..... 21

Number of stacks in blast, December  
31, 1875..... 7  
Number of stacks out of blast..... 14

Rolled iron, excluding rails:  
1873..... 2,588 net tons  
1874..... 1,573 " "  
1875..... 1,005 " "

Cut nails and spikes—kegs:  
1874..... 13,210  
1875..... 9,795

About 800 tons of hammered iron are made  
annually in eighteen Catalan forges. Rail-  
road iron is made only at Chattanooga in  
one establishment, which turned out 12,250  
tons in 1875.

There are four distinct iron belts or areas  
in the State of Tennessee, occupying in whole  
or in part forty-four counties, excluding the  
Cumberland table-land.

1. The Eastern Iron Belt extends through  
the State, and lies mainly in front and at  
the base of the Unaka Mountains.

2. The Dystone Belt skirts the eastern  
base of the Cumberland table-land, or rather  
of Walden's Ridge, from Virginia to Georgia;  
spreads out laterally from ten to twenty  
miles into the Valley of East Tennessee; the  
Sequatchee and Elk valleys are included.

3. The Cumberland table-land is co-  
extensive with the coal measures of the  
State, and extends into Kentucky and Ala-  
bama.

4. The Western Iron Belt lies west of  
Nashville, or, say, west of the Central Basin.

The Eastern Iron Belt.—This belt embraces  
the extreme eastern tier of counties, viz:  
Johnson, Carter, Washington, Greene, Cocke,  
Sevier, Blount, Monroe, McMinn and Polk;  
to these we may add Sullivan, which adjoins  
this belt on the northwest.

Along the North Carolina line is a great  
double range of mountains, constituting one  
of the natural divisions of the State, and  
denominated the Unakas. This range of  
mountains consists of several long, high,  
parallel ridges, intersected by deep cuts or  
chasms, through which the Watauga, Nolich-  
ucky, French Broad, Big Pigeon, Little  
Tennessee, Hiwassee and Ocoee rivers flow  
out of North Carolina and Georgia into this  
State. A part of this range is called Smoky  
Range. The ore banks of the Eastern Iron  
Belt lie mainly to the northwest of this  
Smoky Range, some of them, however, oc-  
curring in the valleys and coves between the  
more westerly ridges.

The most important ore found is what  
mineralogists call limonite, a compound of  
iron, one form of which, common iron rust,  
is well known. In nature it is found in all  
sorts of forms, sometimes as yellow powder,  
which, when mixed with clay, is "yellow  
ochre;" sometimes as a porous, sponge-like  
mass, called honeycomb ore; again in a  
compact, hard stone-like condition. It not  
unfrequently occurs in curious stalactitic  
forms, and often in hollow balls, or "pots,"  
sometimes open, dark, lustrous and slaggy  
in appearance, occasionally with an irides-  
cent play of colors. In all these forms, how-  
ever, it retains the simple chemical composi-  
tion of ordinary iron rust. That composition,  
when the mineral is pure—that is to say, when  
there is no clay, or sand, or other foreign  
substance mixed with it, which, by the way,  
is usual—is in percentage numbers as fol-  
lows:

Iron .....	59.02
Oxygen .....	25.68
Water .....	14.40
	100.00

It contains, therefore, when pure, very  
nearly 60 lbs. of iron to the hundred. Prac-  
tically, owing to the presence of impurities,  
and losses in the reduction, it never yields  
so much.

The purest possible limonite, or brown hem-  
atite, cannot possibly contain more than  
sixty per cent. of pure iron, the assertions of  
mineral enthusiasts to the contrary notwith-  
standing, unless it has undergone the process  
of roasting, whereby the water is expelled.

This ore does not occur in regularly strati-  
fied beds like the dystone, to be mentioned,  
nor in true veins like many other metallifer-  
ous minerals, but is met with in irregular  
masses of all sizes, from small lumps (shot  
ore) up to blocks ten or fifteen feet in diame-  
ter. The matrix is composed of clay, gravel  
and decomposed rock. A spot of ground,  
(it may be a knoll, part of a ridge, or part of  
a mountain slope), in which the ore is dis-  
covered by digging, is called a bank. A bank  
may be defined to be an area beneath which  
lies a considerable depth of clay, sand and  
rocky debris, interspersed with which iron  
ore (limonite) is to be found in greater or less  
quantity, the ore presenting itself, as stated,  
in irregular masses. The banks differ much  
in quantity of ore—some are said to be rich;  
others are poor, requiring the removal of  
much foreign matter; others, again, are  
little else than clay and debris—all require  
the removal of more or less dead matter be-  
fore the ore can be obtained. In many banks  
great excavations, mostly open to the day,  
have been made, into which large buildings  
might be thrown. The banks, although in  
some cases a hundred feet in depth, are  
superficial formations, and rest upon  
stratified limestones, shales and other rocks.  
As may be inferred, mining in such banks is  
rather an uncertain business, both as to the  
quantity and the exact position of the ore.  
Nevertheless, the best of them yield an  
abundance of mineral.

In a given valley, or on a given ridge,  
there may be from one to a dozen banks, the  
latter of any length from a hundred yards to

a mile. In the Eastern Belt, banks occur in  
all the counties. Johnson and Carter con-  
tain many of them, some of which are ex-  
ceedingly valuable.

In Bompas Cove, Washington county, are  
immense deposits of limonite iron ore.  
These banks are very rich, and are found in  
knolls, hills and ridges, which rise above the  
level of the valley from 50 to 250 feet. The  
matrix is a deep brown, or chocolate colored  
earth, and the ore occurs in masses of all  
sizes, from small grains up to lumps as large  
as a sugar hogshead. Some of the ore con-  
tains lead and zinc, and also iron pyrites.  
The limestones and dolomites of the region  
also contain galena in disseminated grains,  
and at one point the galena is so abundant  
that it has been worked as a lead mine; the  
machinery, however, has gone to ruin. As  
to the amount of iron ore in this cove no  
proper estimate can be made, but there is  
but little doubt that it is practically inex-  
haustible. And this cove is but a type of the  
numerous coves which occur from John-  
son to Polk.

In Greene county there are very good  
banks. Two large furnaces have been  
erected in this county since the war. The  
ore yields from 40 to 50 per cent. of tough  
gray iron. That used at one of the furnaces  
in this county is obtained by running a drift  
750 feet into one of the hills about 1000 feet  
from the furnace. At this distance a mass  
of almost solid ore, with a matrix of white  
chalky earth is found, so easily obtained that  
twelve men get out thirty car loads a day,  
weighing each 3000 pounds. The screenings  
of the ore amount to 2-3 of the whole, and  
of the screenings about two-thirds is good  
ore. The drift passes through 600 feet of  
dolomite, which dips at an angle of 45°.  
The deeper the excavations the better the  
ore. It is said, however, to be more refrac-  
tory than the same kind of ore found in  
Stewart, Montgomery and other counties of  
the Western Iron Belt.

Limonite, as has been stated, is the prin-  
cipal ore of this belt. In addition to this,  
the black ore of iron, magnetite of the miner-  
alogists, occurs at one point at Crab Orchard,  
near the North Carolina line in Carter  
county. How much of this there may be we  
are not able to state. Much excellent bar  
iron has been manufactured from it in a  
common bloomery. In Sullivan county, in  
addition to the limonite banks, are banks of  
red ores, hematites. The Crockett and  
Sharp banks afford this variety, and are  
capable of supplying much good ore. In  
McMinn county is a remarkable deposit of  
stratified red ore, which, on account of its  
proximity to the Unaka Range, we include  
in the Eastern Belt. This is Hill's Bank.  
The ore is a stratified, fossiliferous rock,  
much like the ore of the Dystone Belt, to  
be mentioned. This bed of ore is noticeable  
from the fact that it belongs to the Lower  
Silurian series, while the Dystone belongs  
to the Upper Silurian. The main outcrop is  
a third of a mile or more in length, and at  
some points 50 or 60 feet wide.

A similar ore of the same age outcrops in  
the red hills, just south of the railroad be-  
tween Philadelphia and Sweetwater. It is  
accompanied by good manganese ore. The  
thickness of the bed has never been ascer-  
tained, but the abundance of surface ore ap-  
pears to indicate workable amounts. Hema-  
tite, in the form known as specular iron, oc-  
curs in the eastern edge of Cocke county, in  
beds to feet or more in thickness. The ore  
is pretty constantly mingled with quartz and  
feldspar, which are sometimes present in  
such quantities as to make it worthless, but  
other portions contain no more silica than  
can readily be fluxed off in the furnace. The  
special interest of the ore consists in its ex-  
tremely small content of phosphorus, only  
six thousandths of 1 per cent., according to  
analyses made by Prof. O. D. Allen, of the  
Sheffield Scientific School, one of the best  
analysts in the country. The ore is plainly  
well fitted for making the best grades of  
Bessemer steel.

The Tellico ores in Monroe county are  
varied. The limonite is most abundant, but  
there are a few localities where the hematite  
and magnetite are found. The hematite ore  
is so compact that blasting powder is used in  
raising it. It is very pure, having a few  
seams of yellow ochre and white chalky  
earth.

Shot ore is likewise found in this vicinity.  
Donnelly's Bank is the name of the principal  
deposit of this ore. A tunnel has been  
driven into a ridge, and for a while large  
quantities were taken out that yield in the  
furnace 50 per cent.

Many years ago the immense masses of  
brown hematite which cap the copper veins  
at Ducktown, in Polk county, attracted the  
attention of iron men. Many attempts were  
made to work it, but the small percentage of  
copper ore present made the iron worthless.  
Time may develop processes by which it can  
be made available, but at present the quality  
of iron is what is called "red-short," and is  
almost worthless for any practical purposes.

The cost of making iron in the eastern  
iron belt has been definitely ascertained at  
two of the furnaces. The furnace at Em-  
breville (now out of blast) is cold-blast char-  
coal, with two tuyeres driven by water-  
power. The ore is brought from banks at  
the foot of Bompas cove, three miles south  
of the furnace, and delivered in the furnace  
loft at two dollars and fifty cents per ton.  
Charcoal is burned by contract at five cents  
per bushel, and delivered at six and a half  
cents. Good reliable labor can be procured  
for one dollar per day. The estimate is two  
tons of ore, and 150 bushels of charcoal for  
one of iron.

At the Unaka Furnace, in Greene county,  
all the work except that done by the im-  
mediate furnace hands, is done by contract.  
Coal is burned and delivered at prices varying  
from 6 cents to 7½ cents per bushel, accord-  
ing to the magnitude of the contract, the  
highest price being paid on the largest con-  
tracts. Though owning rich banks of ore,  
the proprietor has been supplied by outside  
parties, who are paid \$5 for every ton of iron  
made from the ore delivered, or a little less  
than \$2.50 a ton for ore. Wood privileges  
are purchased at 5 cents per cord or \$2 per  
acre.

One peculiarity about the ore obtained at  
Unaka Furnace is that no flux is required in  
its reduction. It is largely intermixed with  
the black oxide of manganese, which an-  
swers the purpose of a flux. The yield from  
[Continued on page 7.]



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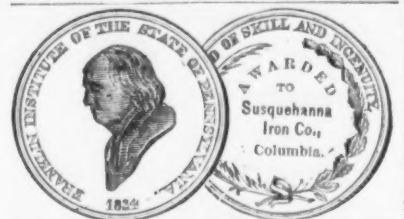
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**New Patents.**  
We take from the records of the Patent Office in Washington the following specifications of certain patents lately issued, which will be found interesting:

**IMPROVEMENT IN PROCESSES OF CONVERTING CAST IRON INTO CAST STEEL.**

Specification forming part of Letters Patent No. 189,273, issued to Charles William Siemens, of Westminster, England.

This invention relates to the methods and means made use of for converting cast iron into cast steel; and the nature thereof consists in pouring, tapping, or otherwise conveying the furnace charge into a heated ladle lined with refractory material, and containing rich ferro-manganese in a solid condition, and thereby preventing the ferro-manganese from oxidizing, and insuring a definite proportion of manganese in the metal produced.

We quote as follows from the specifications:

My improvements may be applied to various processes now in use for refining cast iron, and therefore I do not confine myself to the particular means and methods of decarbonization hereinafter set forth, but merely describe them in order to illustrate the applications of my invention.

When my improved methods are applied to the regenerative gas furnace, a bath of cast or pig iron is first brought to a high temperature by the action of the flame. Upon the bath thus heated either ore, puddled steel, scrap iron, or old rails, may be thrown, charged or otherwise introduced. When ore is thus used it may be previously cemented and roasted before being charged into the bath. When it is intended to convert old iron or steel rails, or other scrap metal into cast steel, I prefer to charge into the furnace, say, about three tons of scrap, intermixed with two tons of comparatively pure pig metal, and to continue firing until the whole charge has become a fluid mass. The degree to which the bath has been refined is determined by drawing out and ex-

The regenerative gas furnace, as shown in the drawings, is built of fire brick or other suitable refractory material, and consists of the four regenerators with the flues and valves and the heating chamber, where the metallurgical operations are carried on. The four regenerators are arranged in pairs, and vary in size, the smaller being used for the passage of gas, and the larger for that of air, proportions being in the ratio of two to three approximately. These ratios correspond to the quantities of gas and air required to insure complete combustion in the heating chamber. The walls of the regenerators are built of fire brick or other suitable refractory material, closely laid and whitewashed or otherwise made gas-tight so that no leakage may take place from one chamber to another. These chambers are filled with refractory material, by preference fire brick stacked loosely together, and each regenerative chamber has its own separate flue at the base communicating with the valves, by which the gas and air enter or the products of combustion pass out, while from the top or side of each regenerator chamber a flue passes upward and communicates with the heating chamber, and I prefer to cause the air to enter the heating chamber above the gas, as by its superior specific gravity at equal temperatures, it tends to sink through the gas, and thus an intimate mixture and more perfect combustion are obtained.

The entering or issuing gaseous currents pass through valves not shown.

The heating chamber where the metallurgical processes are carried on has its roof and sides constructed of highly refractory materials such as best silica or Dinas bricks. The bed is usually made of sand, but in some cases an oxide of iron bottom is preferable.

Below the center of the furnace is an open space through which air freely circulates, and rises through openings into the air space below the melting chamber and behind the bridges, whereby a perfect cooling of the sides of the melting chamber is effected. This cave serves, moreover, as a receptacle

banked up readily by means of sand or other refractory material to the height required.

The process of manufacturing steel by tapping, turning, pouring, or otherwise transferring the charge of a furnace or other apparatus for refining cast iron into a heated ladle lined with refractory material, and containing ferro-manganese in a solid condition, as and for the purposes described.

#### CORRECTION.

To the Editor of *The Iron Age*.—DEAR SIR: In your issue of the 25th inst., under the head of "New Patents," I notice my patent of March 6th, 1877.

The part of the specification describing the terms "fast" and "loose" was written by my solicitor (at the request of the examiner in the Patent Office) after the papers were otherwise completed, and never submitted to me, and I knew nothing of it till the patent was issued. I immediately took steps to have it corrected, but was told it could not be done except by reissuing the patent, and as I felt it could do no harm, I have let it stand.

As any person conversant with the terms "fast" and "loose," as used by saw makers, would see that the description there given is both absurd and ridiculous, I would ask you to publish this in explanation.

Yours, very truly, GEO. F. SIMONDS.  
PITTSBURGH, MASS., June 30, 1877.

#### Early Efforts at Torpedo Defense.

During the war with England in 1812 an effort was made to protect the harbor of New York by means of torpedoes. The effort fell through, however, and for the time no further attempts were made to test the practical workings of the invention. Notwithstanding this, however, Col. Samuel Colt and other Americans continued to study the theory of defending harbors by means of submerged cases containing powder. Their investigations resulted in the discovery of a system by which torpedoes were exploded by means of electricity. It was not until the Crimean war, however, that they were again put into practical use and then only to a limited extent. Since that time wonderful improvements have been made in the torpedo, and now, in the opinion of some of the best known American engineers, the harbors of this country, in case of war with foreign power, could be protected from invasion by their instrumentality alone. As they are now constructed in the United States, the torpedoes are of various forms and sizes, and adapted to many different sorts of service. The simplest form is the stationary torpedo, known as "the contact torpedo." They are used solely for coast and harbor defense, and are exploded by coming in contact with the bottom of a ship which attempts to pass over or by the place where they have been fixed. Other torpedoes of the same general form as the above, and intended for the same use, are so arranged that they can be exploded by means of electric communication between them and the shore. The proper moment for the explosion is usually indicated by a reflector, upon which the outlines of the fated ship are cast as soon as she comes within the power of the mine which has been laid for her destruction. Many of the recently constructed torpedoes (most of them were invented in this country, and can now be examined at the United States torpedo station on Willett's Point, Long Island), are supplied with propellers, or attached to rockets, by means of which they can be projected against an enemy's ship from the shore, or even, in some instances and under certain circumstances, from the open sea. The velocity of these rocket torpedoes is about one-third as great as that of an ordinary cannon ball, and, of course, it would be impossible for a ship by rapid maneuvering or change of position to escape destruction, provided always that the rocket was properly directed. In addition to those mentioned, other forms of moving torpedoes are so constructed that they can be propelled from place to place under the surface of the water. Some of these are "set" by means of clockwork, and move in a straight line. Others are so arranged that their movements can, to a certain extent, be controlled by means of a thin and flexible wire thread connecting with powerful electrical instruments on the shore.

#### Disc Rolls.

To the Editor of *The Iron Age*.—DEAR SIR: I am pleased to find in *The Iron Age* of July 5, 1877, that in an editorial you claim for me the invention of the disc rolls. This is not true, but I am the original inventor of machinery for the manufacture of cylindrical bars of iron and steel, which cause the metal to rotate around its own axis while being compressed, as the Patent Office records will establish when the question comes into court. I have endeavored, with great patience, to arrange this matter with parties who are infringing my rights, but without success, and will now take them into court.

I am prepared to build the disc rolls for straightening iron, steel or tubing; also for planishing iron or steel for shafting. Thanking you for your kindness, I am, yours, truly,  
JACOB REESE.  
PITTSBURGH, July 6, 1877.

**Glycerine for Oil Stones.**—Almost every one has more or less use for an oil stone, but in these days a good oil is hard to obtain, and kerosene is often used instead. This is a bad plan, for although it makes the steel "take hold," it ruins the stone. Glycerine is much better, does not dry on the stone, and is easily washed off when dirty. Use soap or soda and water to clean the stone, and then apply the glycerine. Clean water is only needed to wash the stone with, and if treated in this way it can be kept bright for a long time with the grit unimpaired.

The lightning performed a singular freak recently during a thunder storm at a residence in Brooklyn. It descended the chimney, tore the ceiling from its supports, overturned the stove and set fire to the furniture and carpets. Mrs. Smyth, who was in an adjoining bedroom, received a stroke which slightly injured her side.

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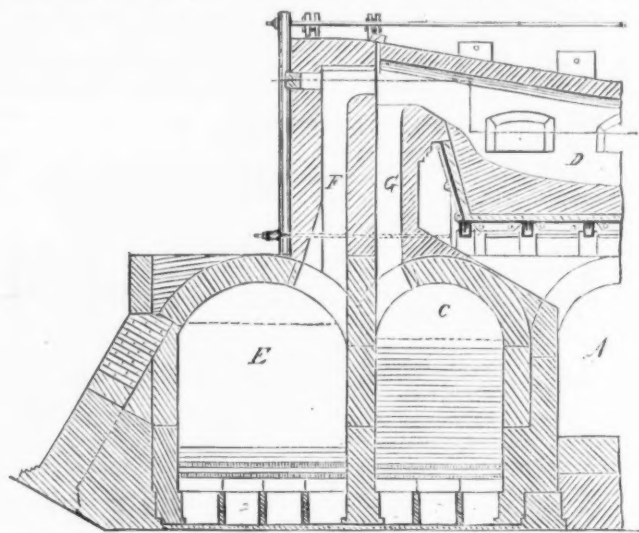
aming a sample of the bath, and more scrap metal, or metallic oxide, or ore is added until the samples show the requisite percentage of carbon, when the whole is discharged into a heated ladle containing ferro-manganese, as hereinafter described.

The scoria floating on the metallic bath is run off continuously, or at suitable intervals, during the process of decarburization without discharging the metal itself, and for this purpose the doors or openings of the furnace should be made low enough to suit the lowest possible surface level of the metallic bath and rendered capable of being banked up readily by means of sand or other refractory material to the height required. By thus removing the slag from the metal either continuously or at certain intervals during the carburization of the pig metal forming the metallic bath, two important advantages are obtained, viz.: the process of decarburization is accelerated in consequence of the more direct access of the flame to the surface of the metal, and the quality of the metal is improved, because the slag, which at comparatively low temperatures, takes up a considerable proportion of the sulphur and phosphorus originally contained in the materials employed, yields back these impurities to the metal as the higher temperatures of mild steel are approached, so that it is very important to get rid of it as soon as possible.

By these means a comparatively pure metal may be obtained from impure materials, and the time necessary for completing a charge is materially lessened. When the metal is sufficiently decarburized, as may be ascertained by chemical test and by the appearance of a chilled and fractured sample, the charge is tapped into a movable ladle lined with fire clay and heated internally by means of a gas flame, or otherwise, to low redness. Before tapping, rich spiegelisen or ferro-manganese is broken up into small pieces and distributed over the bottom of the ladle, where it becomes and is kept heated by the continuous action of the flame and heated lining, and thus is readily melted by the stream of liquid metal from the furnace. The quantity of ferro-manganese required depends upon the percentage desired in the metal, and one of the principal advantages realized by this mode of working consists in not allowing the manganese any opportunity of oxidizing, and thus a definite proportion of manganese is insured in the metal produced. At the same time a saving of ferro-manganese is effected, and the process of manufacture is simplified.

Although any suitable apparatus or furnace may be made use of for refining or partially decarburizing the molten metal previous to its being tapped or poured into the ladle, yet I prefer to make use of a regenerative gas furnace of the construction shown in the accompanying drawing, but do not claim such specially, as it forms the subject of a separate application now pending.

The accompanying drawing is a partial longitudinal vertical section of the furnace.



PARTIAL LONGITUDINAL VERTICAL SECTION OF SIEMENS FURNACE.

for any metal which may break through the sides or bottom of the melting chamber, whence it can be removed at leisure without meanwhile encumbering the ventilating spaces around the melting chamber.

On first lighting the furnace, the gas passes through the proper valves and flues into the bottom of the regenerator chamber C, while the air enters through corresponding valves and flues into the generator chamber E, which should be about one-half larger than the gas regenerator chamber C. The currents of gas and air, both quite cold, rise separately through the regenerators C and E, and pass up through the flues G and F, respectively, into the furnace above, where they meet and are lighted, burning and producing a moderate heat.

Each air port rises from its regenerator behind the corresponding gas port, and is projected into the furnace over such gas port, it being important that the air port should overlap the gas port on both sides. Great solidity of brickwork and perfect combustion are thereby attained. The products of combustion pass away through a similar set of flues at the other end of the furnace into the regenerator chamber E, which are not shown by the drawings, but are symmetrically disposed and of like construction to the chambers C E, already described, and thence through properly constructed flues and valves to the chimney flue. The waste heat is thus deposited in the upper courses of open fire brick work, filling the chambers E, and heats them up, while the lower portion and the chimney flues are quite cool; then, after a suitable interval, the flaps, through which the air and gas are admitted or withdrawn from the furnace are reversed, and the air and gas enter through those regenerator chambers C E, which have just been heated by the waste products of combustion, and in passing up through the checker work they become heated, and then, on uniting and entering into combustion in the furnace D, they produce a very high temperature, the waste heat from such higher temperature of combustion heating up the previously cold regenerators C E to a corresponding higher heat. Thus an accumulation of heat and an accession of temperature are obtained step by step, so to speak, until the furnace is as hot as required. The heat is at the same time so thoroughly abstracted from the products of combustion by the regenerators that the chimney flue remains comparatively cool. The command of the temperature of the furnace and of the quality of the flame is rendered complete by means of gas and air regulating valves and by the chimney dampers.

One or more doors or openings are provided at such an elevation that the scoria floating on the metallic bath may be run off continuously, or at intervals, during the process of decarburization without discharging the metal itself, and for this purpose these doors or openings should be made low enough to suit the lowest possible surface level of the metallic bath, and rendered capable of being



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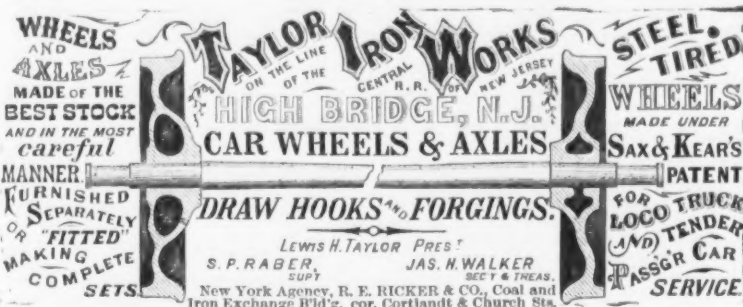
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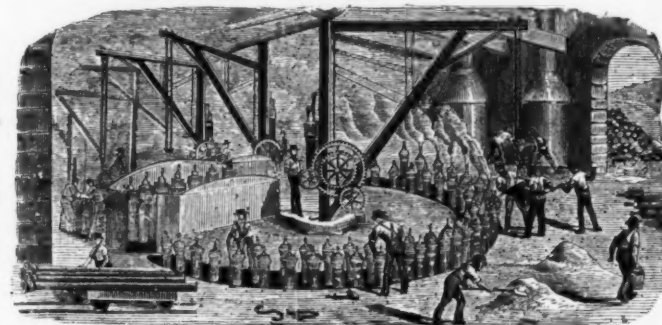
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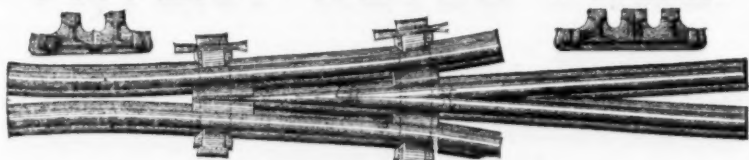
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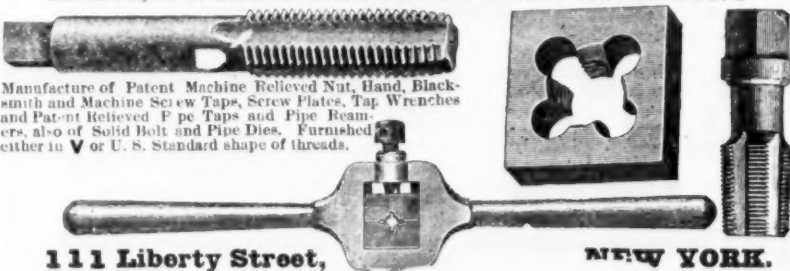
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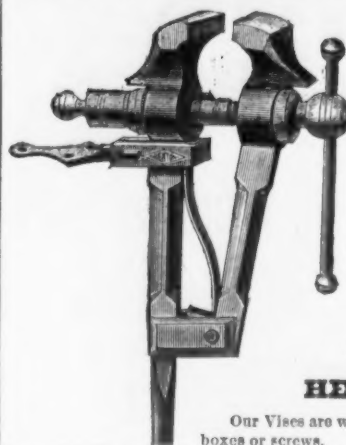
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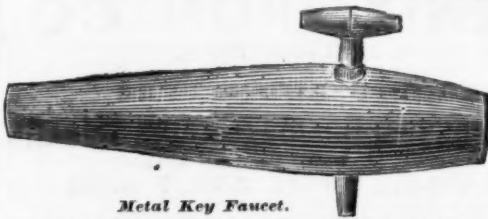
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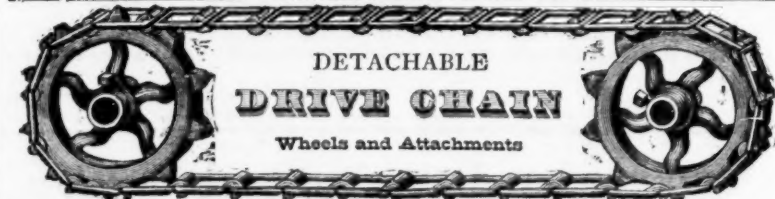
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LOOSE PIN REVERSIBLE,

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Japanned, Fluted, Enamelled, Nickel Plated

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**IRON & BRASS PUMPS.**

Clatern, Well, and Force Pumps, Yard, Drive Well, Garden Engine and Steam Boiler Pumps, Hydraulic Rams, etc., and all with the most modern improvements.

**Centennial Spring Hinges.**

This Hinge has two flat coil springs, very powerful. It has a heavy solid pintal, giving much less friction than a hollow pintal. It has broad, solid bearings in the knuckle, which do not wear down readily and let the door sag. It is Fast Joint, therefore can be used for either right or left hand. By actual test it has an average of 50 per cent. more power than other Spring Hinges in common use of same size.

Fine Castings a Specialty.

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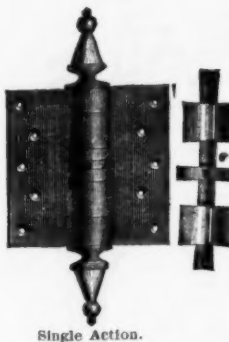
Warehouses,

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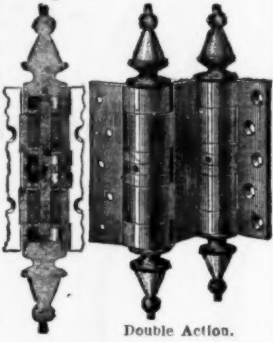
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ESTABLISHED 1845.

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Also Lane's Portable Coffee Roaster

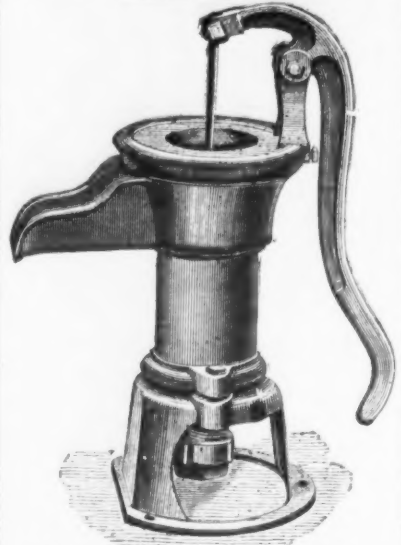
Will roast 30 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers

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**PUMPS, STEAM PUMPS, ROTARY PUMPS, CENTRIFUGAL PUMPS, PISTON PUMPS,**  
for Tanners, Paper Mills, Fire Pumps, suitable for all situations imaginable.



Also, HAND FIRE ENGINES.

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**W. S. BLUNT'S**  
Universal Force Pumps.

Secured by Letters Patent.

These Pumps have enormous power, and are for the house or for outdoor wells of any depth. They are constructed with special regard to strength, ease of working and durability. They can be immediately changed from lift to force pumps, and the air chamber can be revolved, so as to allow the handle to work at any desired angle with the spout. Having close tops, they cannot be tampered with. Attention is called to our new elegant pattern Deep Well Non-Freezing Fire Pump. Also, Blunt's Sand Vacuum Chambers—a complete protection against sand or gritty water in dug or driven wells, pits, mines and rivers. For hand or steam pumps, all sizes, from 1 1/2 inch to 4 inch suction pipe. Send for circulars to

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Carriage, Machine, Floor, Stove and

Two Bolts, Coach Screws,

Bed Screws, &amp;c.

BIRMINGHAM, CONN.

**Babcock's Sash Fastener,**

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Needs but to be seen to be Appreciated.

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JOHN H. REOCK, PASSAIC SPRING WORKS.

Manufacturers of Railroad Car, Locomotive, Omnibus

Platform and every variety of Carriage and Spring

Springs, 473 to 260 Passaic St., Newark, N. J.

Lock box 155

**Notes on the Iron Resources of Tennessee.**

the furnace will average about 53 per cent., and the amount of charcoal used for a ton of pig metal will average about 120 bushels. The furnace is hot-blast, with three tuyeres, the blast being driven by a 65 horse-power steam engine, the surplus gas from the tunnel head being used to generate steam. The circle at the bottom of hearth is 44 inches; height of tuyeres from bottom of hearth, 24 inches; inclination of bosh, 66°; width, 9 feet 3 inches; height of stack, 32 feet 5 inches; size of tunnel head, 21 inches. The following will show the cost of making 9 tons of pig metal, being one day's work:

Ore for 9 tons at \$5.....	\$45.00
Actual expense to put in furnace, including roasting, washing, etc.....	15.25
All furnace hands, including engineers, salaried officers, etc.....	17.50
340 bushels coal at 7 cents.....	58.80
	\$136.55

One-ninth of which is..... 18.17  
To this should be added the interest on investment, say, \$1 and \$5, the cost of delivering to Greenville, making the whole cost delivered on the railroad \$21.17. But, as the work is nearly all paid in goods, upon which a profit of from 30 to 100 per cent. is realized, it brings down the actual cost to very low figures, not more than \$15 per ton in money delivered on the railroad.

Potsdam Furnace, within two miles of the Unaka, is out of blast. It used ore from the same banks and had a capacity of about 6 tons per day.

The quantity of iron made in the eastern iron belt is small, on account of the inadequacy of railroad facilities. While the quantity produced in this region will not exceed 7000 tons annually, the capacity of the furnaces is equal to the production of 15,000 tons. This charcoal, cold-blast iron is very superior. Its chilling properties are just such as to make it most suitable for the manufacture of car wheels, axles, locomotive tires, and, indeed, for everything in which toughness, elasticity and strength are required. A fair test was also given to this iron at West Point, for armory purposes, and proved entirely satisfactory.

**The Dystone Belt.**—This belt of iron ore is remarkable for its length and richness. It skirts the eastern base of the Cumberland table land, and extends from Chattanooga to Cumberland Gap, a distance of 160 miles. The following counties, or parts of them, are embraced within this belt: Hancock, Claiborne, Grainger, Union, Campbell, Anderson, Roane, Rhea, Meigs, James, Bradley and Hamilton. The belt includes the Sequatchie and the Elk Fork Valleys, which places parts of Marion, Sequatchie and Bledsoe counties within its area.

The chief ore of this belt is a stratified red iron rock, called at many points Dystone, being sometimes used for dyeing purposes. It is highly fossiliferous. Like a limestone, or a bed of coal, and unlike the limonite of the eastern belt, it occurs in layers. Its quantity, in any given locality, can therefore be estimated, and the result of a given amount of mining can be calculated with some precision. As a mineral species, the ore is a variety of hematite, which in plain English is bloodstone, the word referring to the color of the ore. If we take common iron rust and burn it, we obtain a red rust, the change being brought about by the expulsion of water simply. Common brown or yellow iron rust is then limonite, the same burned is red hematite. By the burning more than 14 per cent. of water is expelled. The composition of hematite is as follows:

Iron.....	70
Oxygen.....	30
	100

One hundred pounds of the pure ore might be made to yield 70 pounds of iron, but, as in case of limonite, the impurities defeat this maximum production. In practice from 40 to 50 per cent. (and rarely 60) may be regarded as a good yield. The ore usually soils the fingers readily. At some points it is hard and is quarried out in blocks; occasionally it is soft and easily crushed. The impurities in it are sandy and argillaceous matter and carbonate of lime. Originally much of it contained limestone matter, this having been in the course of ages leached out, leaving red layers as we now find them.

One, and at many points, two or more layers of dystone outcrop at the eastern base of the table land, almost without a break, throughout its whole extent from Virginia to Georgia. Also in many of the minor ridges, lying from one to ten miles from the table land, but running parallel with its eastern border, are other outcroppings. The latter will perhaps, in the aggregate, equal an outcrop extending continuously through the State and following the direction, as above, of the outline of the table land. In addition there are lines of outcrops in Sequatchie and Elk Fork valleys. Elk Fork Valley is in the extreme northwestern part of Campbell county. One of the richest deposits of this ore occurs within a few hundred yards of Cumberland Gap, and extends without a break twenty miles along the mountain, and is half a mile in width. It forms a regular stratum of Walden's Ridge, four feet beneath the surface, and varies from eighteen inches to three feet in thickness. This stratum is parallel with the slope of the ridge, and forms a complete sheet or shield, with an overlying stratum of clay, sand and gravel. The ore is raised with powder and thrown out in large, broad sheets. It is here very hard and massive. The whole cost of raising this ore at Cumberland Gap and depositing it in the bridge left ready for smelting, is \$1 per ton. This fact will be appreciated by the reader when he reflects that ores delivered ready for smelting in the Pittsburgh furnaces cost from \$8 to \$12 per ton. On the spurs which shoot out from the Cumberland table land are deposits of limonite iron ore of superior excellence, yielding from the furnace 50 per cent. This ore caps the hills, forming a ledge with intermingling gravel from sixteen to eighteen feet in thickness. Some of these beds are said to have an unusually small

quantity of dead matter. In other places in the same vicinity are said to be deposits of the black oxide and silicious iron ore, which have never yet been tested in a furnace.

Limestone for flux and sandstone for hearths are found all through the dystone region. Coal, too, abounds in juxtaposition to the iron ore, though preference, until the establishment of Rockwood Furnace, was given to charcoal, for the manufacture of which there are ample supplies of timber. Until the erection of Rockwood Furnace, since the war, stonecoal had never been used in this State for the smelting of iron.

Very fine deposits of this dystone ore occur in the Half Moon Island region, both on the island and the mainland. Being on the river it is easily transported at small cost to Chattanooga and other points.

A heavy bed of ore along this line of outcrop occurs on Col. Welcker's land just above Kingston. H. E. Colton and others are erecting at Kingston a 20-ton charcoal furnace to use this ore.

But we cannot pretend within our limits to point out all the advantages which this region affords for the manufacture of iron, or to enumerate all the exposures of ores. What has been said is sufficient, perhaps, to give a general idea of the facts. The thickness of the layers varies from a few inches to four and five feet, sometimes swelling out locally from eight to ten.

So far we have spoken of the dystone as occurring in Tennessee; but it has a great range outside of the State. It extends southwestward through the northwest corner of Georgia far into Alabama, and is represented by several lines of outcrops. It is the Red Mountain ore of Alabama, and has yielded many hundred tons of iron in that State. To the northwest it extends into Virginia, and indeed through it, reaching into Eastern Pennsylvania, where it is extensively reduced in splendidly appointed furnaces.

The layers of ore are attended with shales and thin sandstone, which with the ore make up the dystone group or formation. This is a part of the Niagara geological series. The dystone group is often associated in the ridges with two other formations, the black shale and the silicious group, both of which lie above it. The three make a trio of formations often met with.

Prior to the war there were in the Dystone Belt five blast furnaces and fifteen bloomeries. The quality of the iron made was excellent. Soon after the end of the war attention again began to be directed to the dystone beds, and it was not long before a new era in iron making was inaugurated in a portion of the belt by the building of a superior furnace in Roane county at Rockwood. Including the one at Chattanooga, there are still five furnaces in the Dystone Belt, only one of which uses charcoal.

There will always be a difference of opinion as to the cost of making iron, but we propose to give the reader the benefit of such facts as we have been able to collect by a visit to the furnaces, and by an inspection of the books of the superintendent.

The daily product at the Cumberland Gap Furnace is about three and one-fourth tons. This furnace is cold-blast. It uses charcoal as fuel, the cost of which is six cents per bushel. Cost of raising ore, fifty cents; cost of delivering, fifty cents. Two hundred bushels of charcoal and two tons of ore are required to make a ton of iron. Labor at the furnace for each ton of iron costs \$1.35. Flux costs \$1 per ton, delivered. Forty cents per cord is paid for cutting wood. The estimated cost of making a ton of cold-blast charcoal pig iron at this point is as follows:

200 bushels of charcoal, at 6 cents.....	\$12.00
2 tons of ore at \$1 per ton.....	2.00
1 ton limestone at \$1 per ton.....	.25
Superintendence and labor per ton.....	3.35
Interest on investment.....	.80
Incidentals and repairs per ton.....	1.00
Total.....	\$19.40

The iron made at this point is shipped out by Powell's River to Chattanooga.

The cost of making iron at Rockwood, in Roane county, according to the statement of Gen. Wilder (see letter to Crutchfield), was in 1872, \$14.13 per ton; in 1873, \$15.92, and more recent estimates place it as high as \$18.

There is now in operation a furnace at Chattanooga, erected during the year 1874 at a cost of \$100,000, with a capacity of twenty-five to thirty tons per day. It is hot-blast, stonecoal, and blown with four layers and three nozzles. The blowing cylinder is six feet in diameter, four feet stroke and thirty revolutions per minute. The following charges were made after two months' run, in twenty-four hours, the yield being twenty tons. The prices are for all material delivered in the stock houses:

1760 bushels of coke, at 10 1/2 cents.....	\$189.20
Ore (brown hematite) 42,800 lbs., at \$3.20 per ton.....	61.14
Ore (red hematite) 37,450 lbs., at \$3 per ton.....	50.15
Limestone, 36,380 lbs., at \$1 per ton.....	17.00
Labor and salaries.....	48.00
Interest.....	22.00
Repairs.....	20.00
Total.....	\$407.49

Divide by 20 and the quotient \$20.37 will represent the total cost of making iron at that point with mixed ores while the furnace was running at only four-fifths of its capacity. The yield of ore from the furnace amounted to 55.8 per cent. The limestone used contained 95.4 per cent. of carbonate of lime, 3.3 magnesia, and a small quantity of alumina and silica. The ores work easily, the blast at no time exceeding 400 degrees, as indicated by the pyrometer. The quality of the iron produced has the appearance of Scotch pig, and is far superior to the common mill iron usually made by hot-blast from stonecoal. This Chattanooga iron brought in the market from \$30 to \$35 per ton at a time when the iron market was most depressed. It was the opinion of the officers that more fuel was used than necessary for the reduction of the ores, and this amount was gradually lessening at the date of our visit. The limestone is obtained in the city of Chattanooga, the brown hematite (limonite) from Georgia, and the red hematite from near 1 1/2 Hook landing, eighty miles above Chattanooga on the Tennessee River, (To be continued.)



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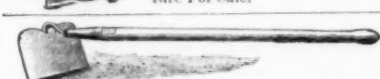
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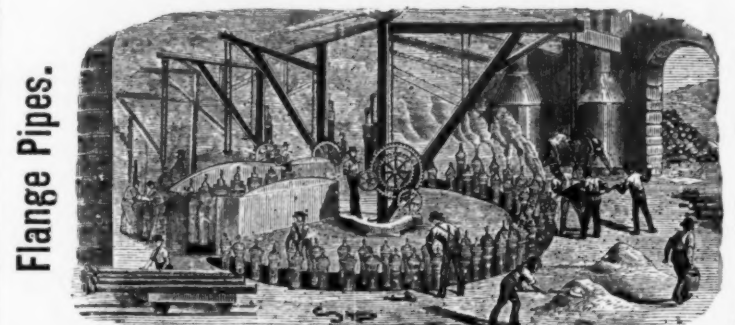
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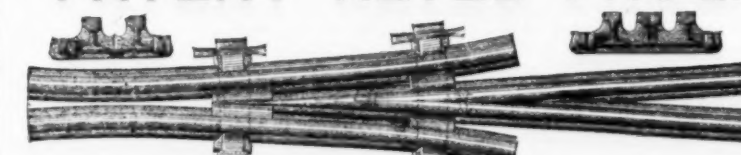
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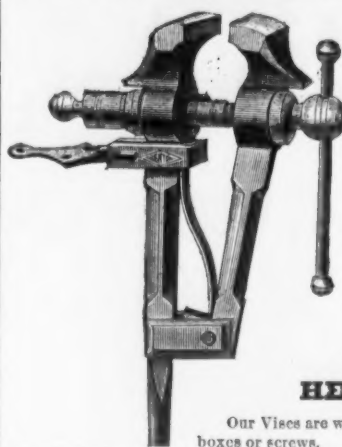


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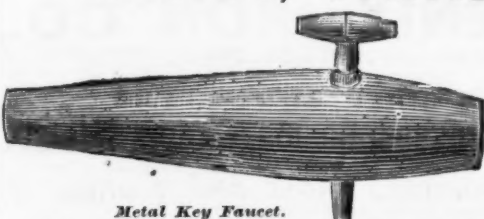
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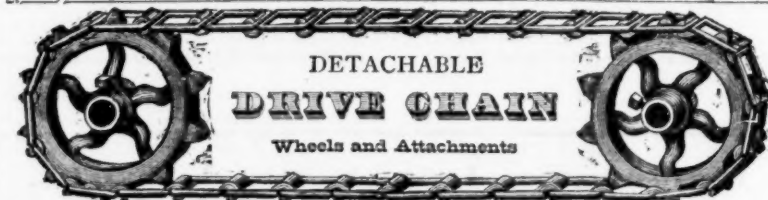
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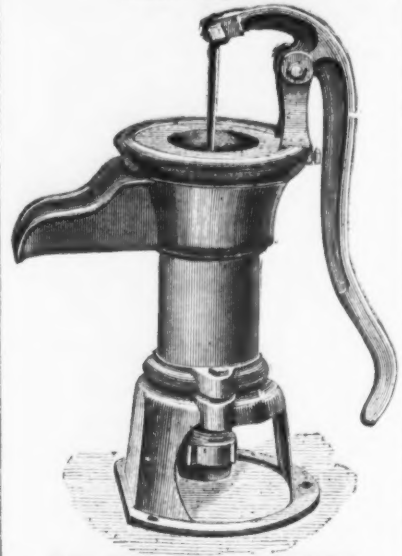
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121 Walnut Street, Philadelphia.

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[Continued from page 3.]

**Notes on the Iron Resources of Tennessee.**

the furnace will average about 53 per cent., and the amount of charcoal used for a ton of pig metal will average about 120 bushels. The furnace is hot-blast, with three tuyeres, the blast being driven by a 65 horse-power steam engine, the surplus gas from the tunnel head being used to generate steam. The circle at the bottom of hearth is 44 inches; height of tuyeres from bottom of hearth, 24 inches; inclination of bosh, 60°; width, 9 feet 3 inches; height of stack, 32 feet 5 inches; size of tunnel head, 21 inches. The following will show the cost of making 9 tons of pig metal, being one day's work:

Ore for 9 tons at \$5. .... \$45.00  
Actual expense to put in furnace, including roasting, washing, etc. .... 15.25  
All furnace hands, including engineers, salaried officers, etc. .... 17.50  
\$40 bushels coal at 7 cents. .... 58.80

One-ninth of which is. .... \$136.55

To this should be added the interest on investment, say, \$1 and \$5, the cost of delivering to Greeneville, making the whole cost delivered on the railroad \$21.17. But, as the work is nearly all paid in goods, upon which a profit of from 30 to 100 per cent. is realized, it brings down the actual cost to very low figures, not more than \$15 per ton in money delivered on the railroad.

Potsdam Furnace, within two miles of the Unaka, is out of blast. It used ore from the same banks and had a capacity of about 6 tons per day.

The quantity of iron made in the eastern iron belt is small, on account of the inadequacy of railroad facilities. While the quantity produced in this region will not exceed 7000 tons annually, the capacity of the furnaces is equal to the production of 15,000 tons. This charcoal, cold-blast iron is very superior. Its chilling properties are just such as to make it most suitable for the manufacture of car wheels, and nearly all the iron made in this region is consumed in Knoxville and at other points for that purpose. It has been pronounced equal to the best made anywhere for car wheels, axles, locomotive tires, and, indeed, for everything in which toughness, elasticity and strength are required. A fair test was also given to this iron at West Point, for armory purposes, and proved entirely satisfactory.

**The Dystone Belt.**—This belt of iron ore is remarkable for its length and richness. It skirts the eastern base of the Cumberland table land, and extends from Chattanooga to Cumberland Gap, a distance of 160 miles. The following counties, or parts of them, are embraced within this belt: Hancock, Claiborne, Grainger, Union, Campbell, Anderson, Roane, Rhea, Meigs, James, Bradley and Hamilton. The belt includes the Sequatchie and the Elk Fork Valleys, which places parts of Marion, Sequatchie and Bledsoe counties within its area.

The chief ore of this belt is a stratified red iron rock, called at many points Dystone, being sometimes used for dyeing purposes. It is highly fossiliferous. Like a limestone, or a bed of coal, and unlike the limonite of the eastern belt, it occurs in layers. Its quantity, in any given locality, can therefore be estimated, and the result of a given amount of mining can be calculated with some precision. As a mineral species, the ore is a variety of hematite, which in plain English is bloodstone, the word referring to the color of the ore. If we take common iron rust and burn it, we obtain a red rust, the change being brought about by the expulsion of water simply. Common brown or yellow iron rust is then limonite, the same burned is red hematite. By the burning more than 14 per cent. of water is expelled. The composition of hematite is as follows:

Iron. .... 70  
Oxygen. .... 30

One hundred pounds of the pure ore might be made to yield 70 pounds of iron, but, as in case of limonite, the impurities defeat this maximum production. In practice from 40 to 50 per cent. (and rarely 60) may be regarded as a good yield. The ore usually soils the fingers readily. At some points it is hard and is quarried out in blocks; occasionally it is soft and easily crushed. The impurities in it are sandy and argillaceous matter and carbonate of lime. Originally much of it contained limestone matter, this having been in the course of ages leached out, leaving red layers as we now find them.

One, and at many points, two or more layers of dystone outcrop at the eastern base of the table land, almost without a break, throughout its whole extent from Virginia to Georgia. Also in many of the minor ridges, lying from one to ten miles from the table land, but running parallel with its eastern border, are other outcroppings layers. The latter will perhaps, in the aggregate, equal an outcrop extending continuously through the State and following the direction, as above, of the outline of the table land. In addition there are lines of outcrops in Sequatchie and Elk Fork valleys. Elk Fork Valley is in the extreme northwestern part of Campbell county. One of the richest deposits of this ore occurs within a few hundred yards of Cumberland Gap, and extends without a break twenty miles along the mountain, and is half a mile in width. It forms a regular stratum of Walden's Ridge, four feet beneath the surface, and varies from eighteen inches to three feet in thickness. This stratum is parallel with the slope of the ridge, and forms a complete sheet or shield, with an overlying stratum of clay, sand and gravel. The ore is raised with powder and thrown out in large, broad sheets. It is here very hard and massive. The whole cost of raising this ore at Cumberland Gap and depositing it in the bridge left ready for smelting, is \$1 per ton. This fact will be appreciated by the reader when he reflects that ores delivered ready for smelting in the Pittsburgh furnaces cost from \$8 to \$12 per ton. On the spurs which shoot out from the Cumberland table land are deposits of limonite iron ore of superior excellence, yielding from the furnace 50 per cent. This ore caps the hills, forming a ledge with intermingling gravel from sixteen to eighteen feet in thickness. Some of these beds are said to have an unusually small

quantity of dead matter. In other places in the same vicinity are said to be deposits of the black oxide and silicious iron ore, which have never yet been tested in a furnace.

Limestone for flux and sandstone for hearths are found all through the dystone region. Coal, too, abounds in juxtaposition to the iron ore, though preference, until the establishment of Rockwood Furnace, was given to charcoal, for the manufacture of which there are ample supplies of timber. Until the erection of Rockwood Furnace, since the war, stonecoal had never been used in this State for the smelting of iron.

Very fine deposits of this dystone ore occur in the Half Moon Island region, both on the island and the mainland. Being on the river it is easily transported at small cost to Chattanooga and other points.

A heavy bed of ore along this line of outcrop occurs on Col. Welcker's land just above Kingston. H. E. Colton and others are erecting at Kingston a 20 ton charcoal furnace to use this ore.

But we cannot pretend within our limits to point out all the advantages which this region affords for the manufacture of iron, or to enumerate all the exposures of ores. What has been said is sufficient, perhaps, to give a general idea of the facts. The thickness of the layers varies from a few inches to four and five feet, sometimes swelling out locally from eight to ten.

So far we have spoken of the dystone as occurring in Tennessee; but it has a great range outside of the State. It extends southwestward through the northwest corner of Georgia far into Alabama, and is represented by several lines of outcrops. It is the Red Mountain ore of Alabama, and has yielded many hundred tons of iron in that State. To the northwest it extends into Virginia, and indeed through it, reaching into Eastern Pennsylvania, where it is extensively reduced in splendidly appointed furnaces.

The layers of ore are attended with shales and thin sandstone, which with the ore make up the dystone group or formation. This is a part of the Ningara geological series. The dystone group is often associated in the ridges with two other formations, the black shale and the silicious group, both of which lie above it. The three make a trio of formations often met with.

Prior to the war there were in the Dystone Belt five blast furnaces and fifteen bloomeries. The quality of the iron made was excellent. Soon after the end of the war attention again began to be directed to the dystone beds, and it was not long before a new era in iron making was inaugurated in a portion of the belt by the building of a superior furnace in Roane county at Rockwood. Including the one at Chattanooga, there are still five furnaces in the Dystone Belt, only one of which uses charcoal.

There will always be a difference of opinion as to the cost of making iron, but we propose to give the reader the benefit of such facts as we have been able to collect by a visit to the furnaces, and by an inspection of the books of the superintendent.

The daily product at the Cumberland Gap Furnace is about three and one-fourth tons. This furnace is cold-blast. It uses charcoal as fuel, the cost of which is six cents per bushel. Cost of raising ore, fifty cents; cost of delivering, fifty cents. Two hundred bushels of charcoal and two tons of ore are required to make a ton of iron. Labor at the furnace for each ton of iron costs \$3.35. Flux costs \$1 per ton, delivered. Forty cents per cord is paid for cutting wood. The estimated cost of making a ton of cold-blast charcoal pig iron at this point is as follows:

200 bushels of charcoal, at 6 cents. .... \$12.00  
2 tons of ore at \$1 per ton. .... 2.00  
1 ton limestone at \$1 per ton. .... .25  
Superintendence and labor per ton. .... 3.35  
Interest on investment. .... .80  
Incidentals and repairs per ton. .... 1.00

Total. .... \$19.40

The iron made at this point is shipped out by Powell's River to Chattanooga.

The cost of making iron at Rockwood, in Roane county, according to the statement of Gen. Wilder (see letter to Crutchfield), was in 1872, \$14.13 per ton; in 1873, \$15.92, and more recent estimates place it as high as \$18.

There is now in operation a furnace at Chattanooga, erected during the year 1874 at a cost of \$100,000, with a capacity of twenty-five to thirty tons per day. It is hot-blast, stonecoal, and blown with four layers and three nozzles. The blowing cylinder is six feet in diameter, four feet stroke and thirty revolutions per minute. The following charges were made after two months' run, in twenty-four hours, the yield being twenty tons. The prices is for all material delivered in the stock houses:

1700 bushels of coke, at 10¢ cents. .... \$180.20

Ore (brown hematite) 42,800 lbs., at

\$3.20 per ton. .... 61.44

Ore (red hematite) 37,450 lbs., at \$3

per ton. .... 50.15

Limestone, 36,380 lbs., at \$1 per ton. .... 17.00

Labor and salaries. .... 48.00

Interest. .... 22.00

Repairs. .... 20.00

Total. .... \$407.49

Divide by 20 and the quotient \$20.37 will represent the total cost of making iron at that point with mixed ores while the furnace was running at only four-fifths of its capacity. The yield of ore from the furnace amounted to 55.8 per cent. The limestone used contained 95.4 per cent. of carbonate of lime, 3.3 magnesia, and a small quantity of alumina and silica. The ore worked easily, the blast at no time exceeding 600 degrees, as indicated by the pyrometer. The quality of the iron produced has the appearance of Scotch pig, and is far superior to the common mill iron usually made by hot-blast from stonecoal. This Chattanooga iron brought in the market from \$30 to \$35 per ton at a time when the iron market was most depressed. It was the opinion of the officers that more fuel was used than necessary for the reduction of the ores, and this amount was gradually lessening at the date of our visit. The limestone is obtained in the city of Chattanooga, the brown hematite (limonite) from Georgia, and the red hematite from near Hook landing, eighty miles above Chattanooga on the Tennessee River, (To be continued.)

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Manufacturers of all styles Plain and Ornamental Butts,

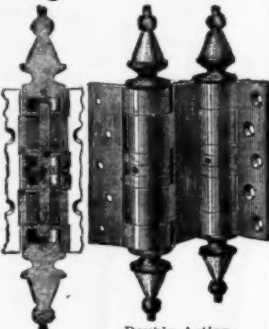
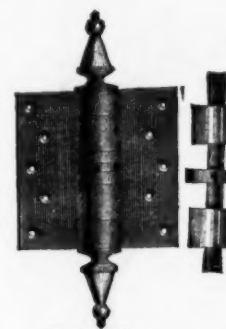
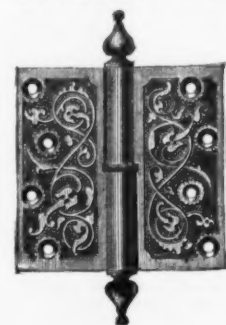
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Well, Garden Engine and Steam Roller Pumps,  
Hydraulic Rams, etc., and all with the most modern  
improvements.**Centennial Spring Hinges.**

This Hinge has two flat coil springs, very powerful. It has a heavy solid pintal, giving much less friction than a hollow pintal. It has broad, solid bearings in the knuckle, which do not wear down readily and let the door sag. It is Fast Joint, therefore can be used for either right or left hand. By actual test it has an average of 50 per cent. more power than other Spring Hinges in common use of same size.

Fine Castings a Specialty.  
**NEW BRITAIN, CONN.**

Warehouses,  
98 Chambers St., N. Y.  
67 Kilby St., Boston, (Pumps.)  
Heaton & Denckla, 507 Commerce St., Phila. (Butts.)  
Send for Illustrated Catalogue and Price List.



Single Action.

Double Action.

**THE IMPROVED  
HOWE SCALES**

In Competition with the World, at Philadelphia, 1876.

**TWO FIRST MEDALS, and TWO DIPLOMAS OF MERIT**

The following are the points that the Judges officially announce as the basis of their award of the highest honors to the Howe Scales:

- 1st. For their Protected Bearings (the Howe is the only Scale with protected bearings), which makes the Scale **DURABLY ACCURATE.**
- 2d. For their Strength.
- 3d. For their Simplicity.
- 4th. For their economy in construction.
- 5th. For their first-rate material and workmanship.
- 6th. For their various original improvements and adaptations (which being patented are exclusively possessed by the **HOWE**).

**The Improved Howe Scales**

MADE BY THE

**BRANDON MFG. COMPANY, of Brandon, Vt.,**

Are Guaranteed Superior to all others.

For Plans, Prices and other information, address,

**A. M. GILBERT & CO.,** 95 to 101 Lake St., Chicago. 116 Main St., Cincinnati. 612 N. Third St., St. Louis.

**PAGE & CO.,** 3 Park Place, New York City. 63 Wood St., Pittsburgh.

**I. S. WILLIAMS,** - - - - - 213 Market St., Philadelphia.

**PRIEST, PAGE & CO.,** - - - - - 145 Franklin St., Boston.

**V. S. W. PARKHURST,** Cor. Market & Fremont Sts., San Francisco, Cal.

**FROTHINGHAM & WORKMAN,** - - - - - Montreal, Canada.

**THE SWIFT MILL.**

ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. We make more than 30 styles.

**Also Lane's Portable Coffee Roaster**

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times.  
Send for descriptive list to Manufacturers

**LANE BROS., Millbrook, N. Y.**

Also sold by leading wholesale houses.



## USE THE BEST.



Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works. Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.

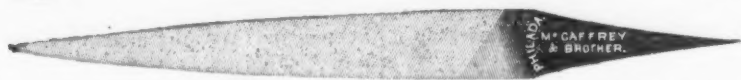
Granted for

After more than Fourteen Years of Competition

Superior Goods.



McCaffrey's Philadelphia Hand Cut Files and Rasps  
Have Proved their Great Superiority.



Silver Medal.

Highest Premium.

Messrs. ARNOLD &amp; CO.,

310 California St., San Francisco,

Sole Agents for Pacific Coast.

## AUBURN FILE WORKS, Superior Hand-Cut FILES AND RASPS,

MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.

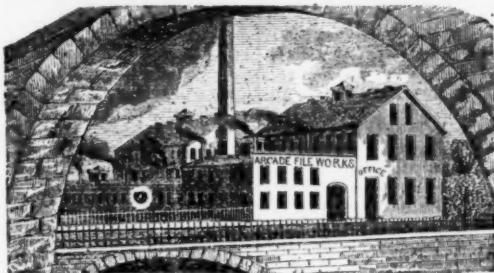
FULLER BROS., Sole Agents,

89 Chambers and 71 Reade Streets, N. Y.

ESTABLISHED 1848.

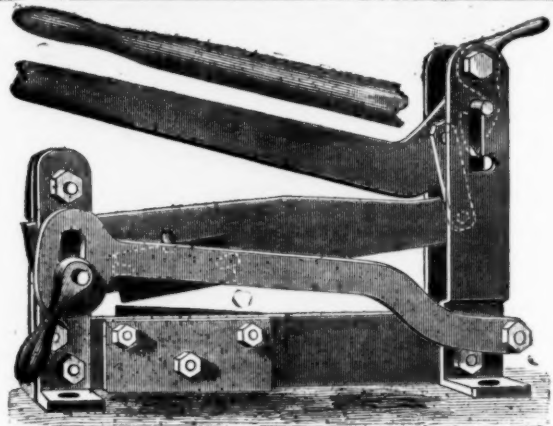
C. T. DRAPER &amp; CO.

Sing Sing, N. Y.

HAND CUT  
FILES AND RASPS

FILES AND RASPS

Made from Best  
ENGLISH CAST STEEL.  
Quality guaranteed by written warranty  
when required.



## PATENT WROUGHT IRON SHEAR.

When not in use occupies a space 6x30 inches, and in use the same space with sufficient room to bring down the lever. Weight 180 pounds. Knives have no holes in them, and can be taken out in three minutes. Can be renewed at the mere cost of the steel. One set of knives should last several years. Guaranteed to cut, readily, Iron Bars 4x3, 6x4, 1 1/2 round, 1 1/2 square; will also cut Plow Steel. We offer them at \$25.00 each, with a liberal discount to the trade.

BROWN &amp; CURTISS,

MANUFACTURERS OF

Patented Wrought Iron Wagon Hardware

SPECIALTIES IN WROUGHT IRON,

Cleveland, Ohio.

## GOLD MEDAL Non-Extensible Razor Belt.

PATENTED JULY 25, 1871.

RE-ISSUED MAY 13, 1873, and JUNE 9, 1874.

In this Strap flexibility of the leather to stretch and become loose and porous is prevented by the use of a patented non-extensible base, which supports the leather and secures

PERMANENT ELASTICITY.

We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality compare favorably with our other well known brands.

BENJAMIN F. BADGER &amp; SON, Manufacturers,

Badger Place, Charlestown, Mass.

## HORSE RASPS AND FILES.



We invite the attention of the trade to our Celebrated American Horse Rasps and Files, made from the very best American Steel all cut by hand, and warranted to give entire satisfaction. All Rasps and Files not stamped as the above are not genuine. Sold by Hardware dealers generally.

Established 1838.

## FILES & RASPS,

Best Cast Steel.

HAND-CUT. Manufactured by

JOHNSON &amp; BRO.

No. 1 Commercial Street, Newark, N. J.

Established 1835. TRADE MARK ON

New Pattern

JOHN ROTHERY

MATTEAWAN

N. Y. John Rothery's

HAND-CUT FILES and RASPS,

Made from English Cast Steel.

JOHN &amp; WILLIAM ROTHERY,

Matteawan, N. Y.



Putnam's Government Standard FORGED

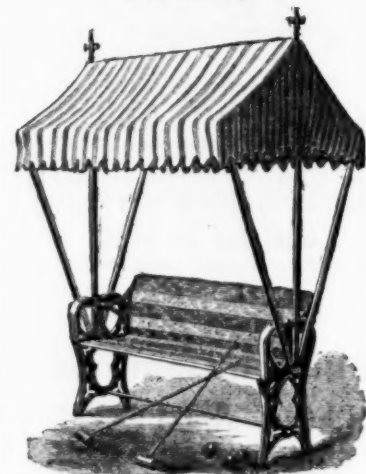
### Hammer Pointed HORSE SHOE NAILS, READY FOR DRIVING.

Manufactured from the best of NORWAY Iron, and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,  
NEPONSET, MASS.

LAWN SETTEES

With Awnings.

HAMMOCKS,  
Lawn Mowers, Lawn Sprinklers,  
Refrigerators, &c.Send for Price List.  
G. WEBSTER PECK,  
Manufacturers' Agent,  
110 Chambers St., N. Y.JOSEPH THOMPSON,  
Block & Pump Maker,36 Burling Slip and 86 South St.,  
Near Pier 30, East River, NEW YORK.STEERING APPARATUS,  
For Steamships, &c., made and fitted up.Iron Pumps Reamed & Re-Chambered.  
Also, Patent Pressed Pump Leathers. Galvanize  
Iron Hanks, Oars, Mast Hooks, Hanks, Belay  
Pins, Hand Spikes, Capstan-bars, Hand Pumps, &c.,  
and every article appertaining to the trade, of the  
best material. General dealer in Lignumvite.

LENNOX &amp; PAINE

Manufacturers of

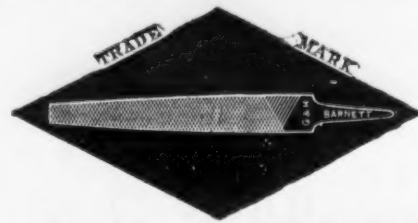
Iron, Brass &amp; Steel Work.

Particular attention paid to Model Making.

Gear cutting for CLOCK WORKS, &amp;c., a specialty.

55 Frankfort St., Cleveland, O.

## Black Diamond File Works.

Send for illus-  
trated Price List.Send for illus-  
trated Price List.

G. &amp; H. BARNETT,

39, 41 &amp; 43 Richmond St., Philadelphia.

St. Louis, Mo., SEMPLER & BIRGE MFG. CO., Agents.  
THOS. TAYLOR, 43 Chambers St., N. Y., Agent for N. Y. and N. E. States.

THOS. JOWITT &amp; SONS, SHEFFIELD,

Manufacturers of every description of

## FILES.

Forged, Ground and Cut by  
Hand and Tempered by an  
Improved Process.

CORPORATE MARK

ROLLERS, TILTERS &  
FORGERS.Manufacturers of  
CAST, SHEAR & BLISTER  
STEEL

TESTED

Importers of  
SWEDISH and RUSSIAN  
IRONS.

For various purposes.

Granted according to Act of Parliament, and Registered in Germany and the United States.

AGENTS:

Messrs. Russell & Erwin Mfg. Co.,  
New York and Philadelphia.Messrs. Huntington, Hopkins & Co.,  
San Francisco and Sacramento.Messrs. Quackenbush, Townsend & Co.,  
New York.Messrs. Frothingham & Workman,  
Montreal.

ESTABLISHED IN 1816.

NO CONNECTION WITH ANY OTHER HOUSE.

PETER A. FRASSE &amp; CO.,

No. 95 Fulton Street, New York.

AGENTS for the American Screw Co.'s Machine Screws and Taps.

SOLE AGENTS Thos. Turner &amp; Co.'s, Files, Horse Rasps.

Hubert's French Emery Paper.

IMPORTERS OF STUBS' Files, Tools, Steel Wire.

GROBET'S Fine Swiss Finishing Files.

VAUTIER, NICOD and RENARD Gravers.

JEWELERS' and Machinists' Supplies.

DEALERS IN Scroll Saw Machines, Bracket Saws, Wood and Patterns.

## CHARLES B. PAUL, Manufacturer of HAND CUT FILES.

Warranted CAST STEEL.

187 Tenth Street, Williamsburg, New York.

All descriptions of Files made to order. Price List mailed on application.

Established 1863.

## AUSABLE HORSE NAILS

POLISHED OR BLUED.

HAMMERED AND FINISHED



## The Ausable Nails

Are Hammered Hot,

And the Finishing and Pointing are  
Done Cold,

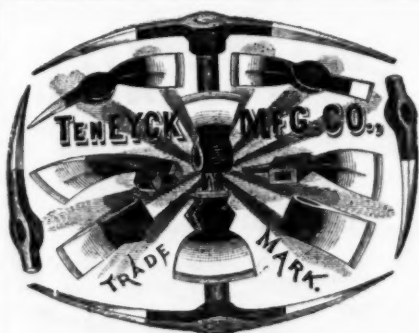
Thus Imitating the Process of Making Nails by Hand.

Quality is Fully Guaranteed.

For Sale by all Leading Iron and Hardware Houses.

ABRAHAM BUSSING, Secretary,

35 Chambers St., New York.



Ten Eyck Axe Mfg. Co

COHOES, N. Y.

Warehouse, 103 Chambers St., N. Y.

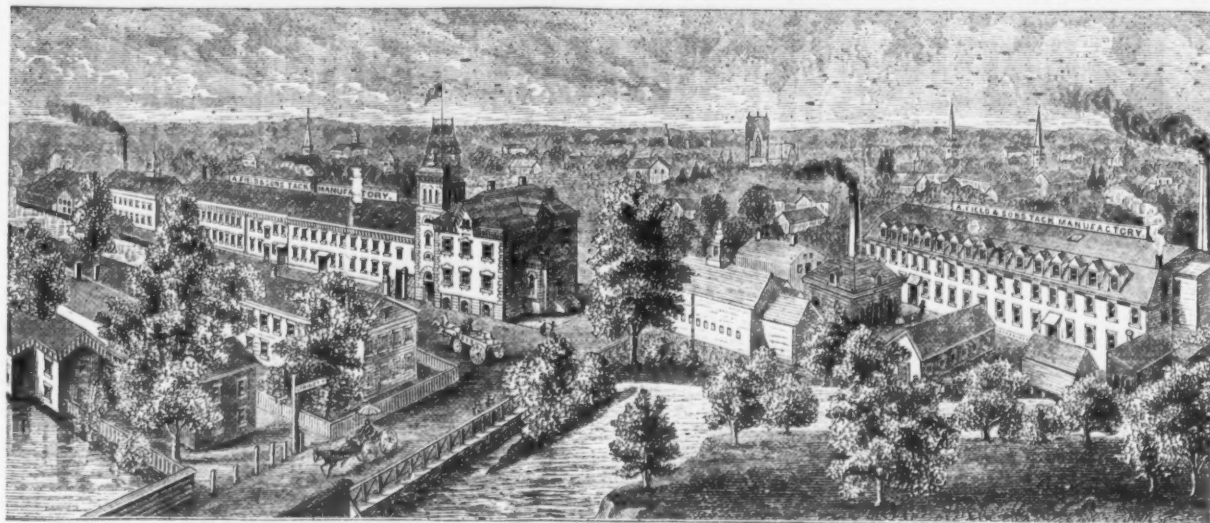
Manufacturers of

## AXES

Of all kinds.

Hatchets, Adzes, Grub Hoes, Mat-  
tocks and Picks.Catalogues and Price Lists furnished upon ap-  
plication.





## A. FIELD & SONS,

TAUNTON, MASS., Manufacturers of

### COPPER & IRON TACKS, TINNED TACKS,

SUPERIOR SWEDS IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

### American and Swedes Iron Shoe Nails,

Zinc and Steel Shoe Nails, Carpet, Brush and Gimp Tacks, Common and Patent Brads, Finishing Nails, Annealed Trunk and Clout Nails, Hob and Hungarian Nails, Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails.

Fine Two Penny and Three Penny Nails, Channel, Cigar Box & Chair Nails, Leathered Carpet Tacks, Glaziers' Points, Etc.

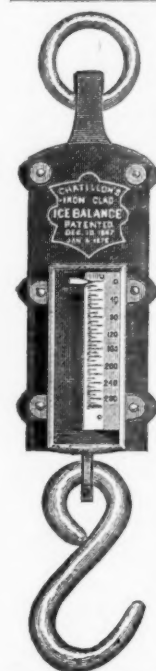
OFFICES AND FACTORIES AT TAUNTON, MASS. WAREHOUSE AT 78 CHAMBERS STREET, N. Y., where may be found a full assortment of Tacks, Brads, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

## Hoisting

Machinery  
Manufactured by  
Crane Bros. Mfg. Co.,  
CHICAGO.

COOKE & BEGGS, Agents, 16 Cortlandt Street, New York.



### THE IRON CLAD Ice Balance.

200, 300, 400 lbs.  
Capacity.

CORRECT,  
COMPACT  
and  
DURABLE.

NOT LIABLE TO GET OUT  
OF ORDER.

Universally Approved  
BY THE  
Ice Companies.

Manufactured only by  
John Chatillon & Sons,  
89, 91 & 93 Cliff St.,  
NEW YORK.

## DROP FORGINGS

### Special Machinery.

Hardware & Tools and Specialties in Metals  
manufactured to order.

HULL & BELDEN CO., Danbury, Ct.

### SILVER'S

### Waste Heat Utilizer and Ventilator.

Is the problem solved? How to utilize waste heat from chimneys, establishing a system of warming and ventilating, based upon sound philosophy and economy. This apparatus requires less fuel when the room is ventilated than if not ventilated, a feature heretofore unknown in the history of heating appliances. For circulars and illustrations address  
L. B. SILVER, Cleveland, O.

### PRIZE MEDALLISTS:

London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1873; Vienna, 1873, and only Award and Medal for Self-Coiling Steel Shutters at Centennial Exhibition, Philadelphia, 1876.

## CLARK & CO.,

ORIGINAL INVENTORS AND SOLE  
PATENTEES OF

### Noiseless Self-Coiling Revolving STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.

Also Improved

### Rolling Wood Shutters

Of various kinds. Clark's Shutters are the Best and Cheapest in the world. Are fitted to new Tribune Building, Lenox Library, Delaware and Hudson Canal Co.'s Building, Transatlantic Steamship Co.'s new Dock, American News Office, &c., Posey County Court House, Mt. Vernon, Holt County Court, Oregon, Mo. Also to buildings in Boston, Cincinnati, Detroit, Janesville, Wis., Baltimore, Canada, &c. Have been for years in daily use in every principal city throughout Europe, and are endorsed by the Leading Architects of the World.

Office and Manufactory,

162 & 164 West 27th Street, N. Y.

## ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

Ansonia Brass & Copper Co.

Office, 19 & 21 Cliff Street,  
NEW YORK.



Cut Showing Round Platform.



Section Showing Edge.

### ANSONIA Bronzed Fire Screen,

With Ornamented Mouldings.

PATENT APPLIED FOR.

The Portable Bronzed Fire Screen or Shield, as shown in the illustration, is especially designed for the safety and protection of walls, furniture, woodwork, paper or varnish from heat. Being constructed of metal, with firm and substantial edges, curved in form to stand alone, it may be easily adjusted to any position about a stove, before a grate or fire place. The demand for something useful, durable and ornamental as a Fire Screen has long been felt, and having finally accomplished the desired result, we are prepared to fill all orders promptly.



## H. A. ROGERS,

BOX 4106.

19 John Street, NEW YORK.

## SUPPLIES, in every variety,

For Railroads, Mills and Manufacturers.

Send for new Illustrated Catalogue, 272 pages.

## G. W. Bradley's Edge Tools.

Butchers' Cleavers,  
Butchers' Choppers,  
Axes and Hatchets,  
Grub Hoe and Mattocks,  
Till Picks,  
Box Chisels and Scrapers,

Ring Bush Hooks,  
Axe Eye Bush Hooks,  
Socket Bush Hooks,  
Watt's Ship Carpenters' Tools,  
Carpenters' Drawing Knives,  
Coopers' and Turpentine Tools.

FOR SALE BY

MARTIN DOSCHER Agent, 96 Chambers Street, N. Y.

## BROWN & SHARPE MFG. CO.

Providence, R. I.

### Tool Grinding Machine.



This machine is much superior to those usually made for a similar purpose. The bearings are self-lubricating, and are so inclosed as to exclude the emery and dust arising from the grinding operations. The boxes are of Hardened Cast Steel, ground to fit the arbor. The arbor carries two wheels, one of which may be fine and the other coarse. Where our patent cutters are in use a beveled wheel can be used on one side and a wheel for tool grinding on the other. Overhead works accompany the machine. The hangers are self-adjusting and have self-oiling boxes. The tight and loose pulleys are 6 inches in diameter, 2 1/2 inches face. Speed of countershaft should be 375 turns per minute. Weight of machine complete, 350 lbs. Price, with everything in cut, \$75.

As an addition to the above (but not shown in cut) an attachment is made adapted for sharpening the teeth of straight, spiral and bevel milling cutters, cotter mills, &c., which can be instantly attached and detached. Price, \$40.

### Improved Combined Sausage Stuffer and Fruit, Lard and Jelly Press.

The improved form which the Enterprise Manufacturing Company, of Philadelphia, have adopted for their combination sausage stuffer and fruit, lard and jelly press, merits the attention of the trade. The large size rack movement machine formerly made by the company and illustrated in our issue of August 31, 1876, did not appear to be as powerful as was desired, and to perfect the invention they designed the screw movement shown in the illustration herewith presented. This they guarantee to give full satisfaction and to exert an enormous power of pressure without requiring the exercise of much physical energy in working the screw. The machine is one of great practical value to farmers and others having use for anything of the kind, and has become one of the standard articles of trade since its introduction.

### A Tin Exhibition.

The Tin Plate Workers' and Wire Workers' Company, of London, have issued the subjoined circular:

SIR.—The master, wardens and court of assistants being desirous of holding an exhibition of tin plates, tin plate manufactures and wirework, we invite your co-operation,

ropes entirely of this alloy. Phosphor bronze ropes are said to have the advantage of offering great resistance to strains of traction, of being very pliable and inoxidizable, and of resisting any attack of corrosive water, while the wear due to the contact of the wires is less than in other metallic ropes; they also preserve their pliability after wear. These phosphor bronze ropes are used in Belgium, at the Bois-du-Duc, Horloz, and Courcelles-Nord collieries, among others.

### Col. Forney on Iron.

In his 4th of July oration at Philadelphia, Col. John W. Forney gave iron a "first rate notice," as follows:

"Take away gold and silver and the whole range of baser metals, leaving us iron alone, and we would hardly miss them. Take away iron and we lose what is next to life and that which sustains life, the greatest boon the Almighty has conferred upon man."

These words were spoken by the lamented Joseph Harrison, Jr., of this city, April 27, 1859, at a public dinner given to the memorable Henry C. Carey, still living, in his 84th year.

The variety of the uses of iron justified the eulogy of the scientific mechanic. These uses are almost infinite. Labor and art are the magicians that have plucked it from the earth and coined it into many adaptations;



COMBINED SAUSAGE STUFFER AND PRESS WITH IMPROVED SCREW MOVEMENT.

and shall feel obliged by your informing us at your earliest convenience if you are prepared to compete for the medals and other prizes to be offered. The following is an outline of the scheme proposed, subject to such modifications as may be deemed advisable after the following suggestions of the company have been considered by yourself and other representatives of the trades interested. The following articles, with such additions as may be decided upon, will be exhibited:

1. Tin plates—in single sheets specimens.
2. Tin-lined cases and casks for packing goods.
3. Cans, canisters, cases and other packages made wholly of tin.
4. Coffin furniture—say, six best designs made from I C coke plates.
5. Domestic utensils—not exceeding thirty pieces—to include dish covers, American ovens, roasters, jelly molds, bread tins, saucepans, coffee pots, hand bowls, patty pans, flour boxes, hot plates, dishes, strainers, fish kettles, candlesticks, lanterns, match boxes.
6. Japanned tin—plain, or in one color—twenty pieces—including traveling trunks, letter boxes, toilet sets, trays, artists' color boxes.
7. Decorated tinware—twenty pieces—including sets of trays, coal boxes, canisters, grocers' fittings, advertising.
8. Tin toys—twenty pieces.
9. Wirework—in iron, copper, steel, brass, gold, silver work—fencing wire, lattice wire.
10. Manufactured wire—including blinds and other wire gauze, netting, flower stands, bird cages, traps, fire guards, sieves, screens, fencing, wire nails.

It is proposed that exhibitors shall pay for the space occupied, and that prizes will be awarded to manufacturers consisting of the freedom of the company, medals and certificates. As soon as the views of the trade have been ascertained from the replies received in answer to this circular, some of the manufacturers will be invited to join the committee appointed by the court of assistants. Your early reply will be esteemed a favor by, yours, faithfully,

S. P. LOW, Master;  
GEORGE OFFOR, Ex-master;  
W. C. ANDERSON, Upper Warden;  
F. E. WILKINSON, M. D., Renter Warden;  
F. W. REYNOLDS;  
C. JENKIN-JONES, Hon. Secretary.

May 15, 1877.  
All communications to be addressed to the Hon. Secretary, 8 Buckingham street, Strand, W. C.

We are not informed whether the competition invited by this circular is restricted to British artisans, or whether Americans and other foreign tin makers are to be admitted. In many specialties we could carry off the laurels, especially in classes 5, 6, 7 and 8, and we are not sure but in 10 also. Our deep stamping beats the world, and in domestic utensils and Japanned ware we could make a showing which would give the British knights of the mallet a surprise. If any of our large manufacturers of sheet metal and iron goods have agencies in England we hope they will push for the admission of their goods, just to show our British cousins that we did not do any better than we knew in getting up samples of our handicraft for the Centennial.

Phosphor Bronze Wire Ropes.—M. J. Manne, the manager of the Phosphor Bronze Works, at Val-Benoit, Liege, has made pit

from the monster Corliss engine, which drives a world of machinery, to the monster Krupp cannon, which hurls its massive missiles over vast distances with unerring precision, to the keen blade of Damascus and the hair springs of our delicate watches; from the huge columns that tower in great capitals, at home and abroad, to the most exquisite female trinket; from the stupendous iron-clads that trample down the tempestuous sea, to the fragile instrument of the fearless surgeon; from the iron locomotive on its rails of steel, to the gossamer fabric almost as light as the air itself; from the massive temple to the trifling toy.

This single mineral, iron, enters into nearly all our wants and luxuries. It helped Franklin to tame the lightning of the skies, and wards that lightning from our homes; it aids the transmission of human thoughts over seas and mountains, to the utmost ends of the earth, almost "as swiftly as the slightest couriers of the air," and it assists the distribution of these thoughts by converting the printing press into an almost conscious being.

The artist, painter, sculptor, architect, physician, astronomer, soldier, sailor and scholar, the builder and the antiquarian, the man of peace and the man of war, the lady in her boudoir, the matron in her kitchen, the poor girl with her hired sewing machine, the poor boy in his fight for a trade, the editor with his steel pen, the printer before his iron case, the engineer as he traces and tracks the wilderness—in most things, practical and poetic, present and future, the things of to-day and to-morrow, this simple gift of God comes as a precious benefaction, making many of His other gifts more useful and rare.

If you will go to the well known home of the same Mr. Harrison to whom I have alluded, you will see how he has illustrated his own thought, and how he has crowned the great guild of human labor. It is a picture called "The Iron Worker and King Solomon," painted for Mr. Harrison in 1865 by the celebrated Christian Schuessle. The object is to show that iron is the chief agent in all the mechanic arts.

The orator then gave a graphic description of the picture, winding up with the words of Solomon the King: "Stay where thou art, and let those who would spurn thee from thy place feel with me the just rebuke thou hast bestowed upon us."

**The Liability of Indorsers.**—The United States Supreme Court, in a recent decision, lays down several principles of law in reference to the liability of indorsers on promissory notes. It holds that an indorser is a competent witness to prove an agreement in writing, made with the holder of the note at the time of the indorsement, that he shall not be held liable thereon, where the paper is still held by the party to whom the indorsement was made and has not been put into circulation. It also holds that an agreement like this and the indorsement taken together are equivalent, so far as the holder of the note is concerned, to "an indorsement without recourse to the indorser." It further holds that the omission of indorsers on a series of notes, under such agreement, to set up the agreement as a defense in a suit brought on two such notes, does not preclude their setting it up in another action brought on other notes of the same series, the judgment in the first action not operating as an estoppel in the second.



# RUSSELL & ERWIN MANUFACTURING COMPANY

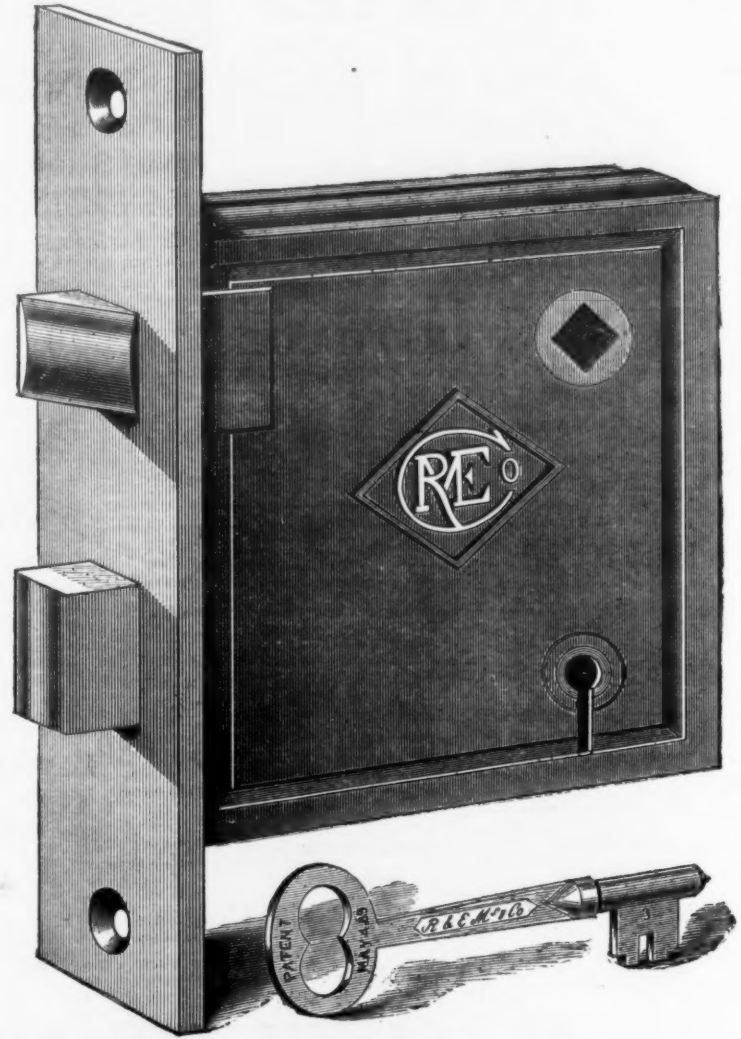
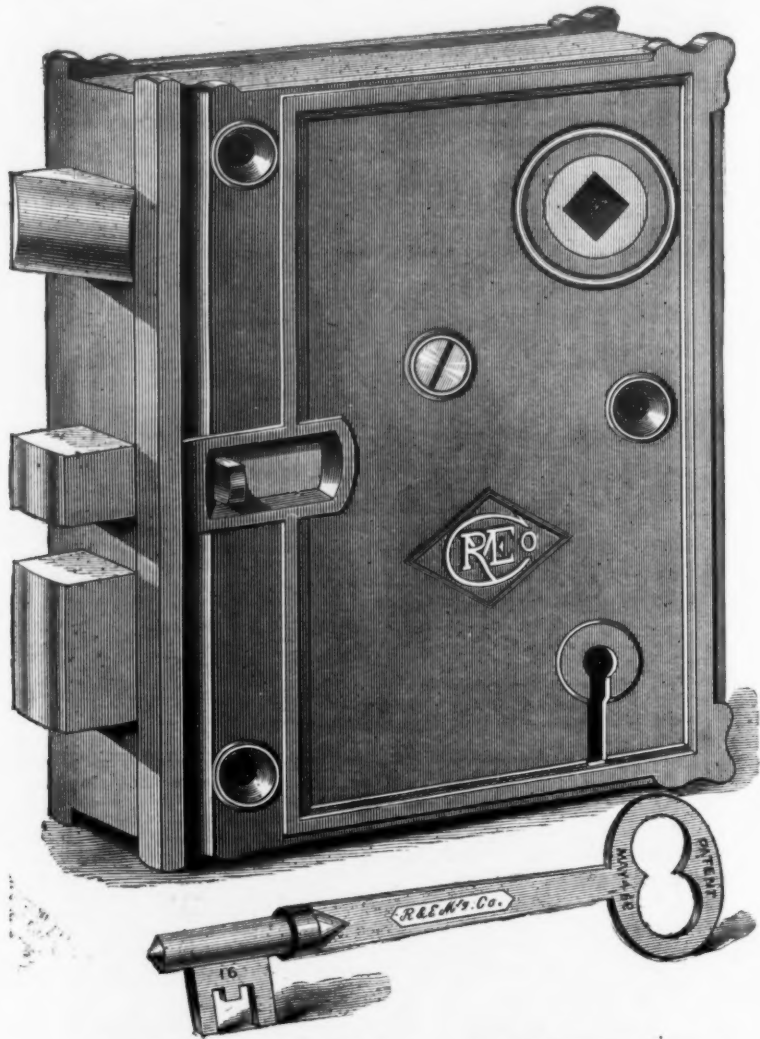
## Manufacturers of HARDWARE.

Factories, NEW BRITAIN, CONNECTICUT, U. S. A.

Manufacturers' Agents and Dealers in General Hardware at our  
**WAREHOUSES,**

NEW YORK, - - Nos. 45 and 47 Chambers Street.  
PHILADELPHIA, - - - No. 425 Market Street.

SOUTHERN DEPARTMENT,  
BALTIMORE, MD., WM. H. COLE, AGENT, 17 South Charles St.



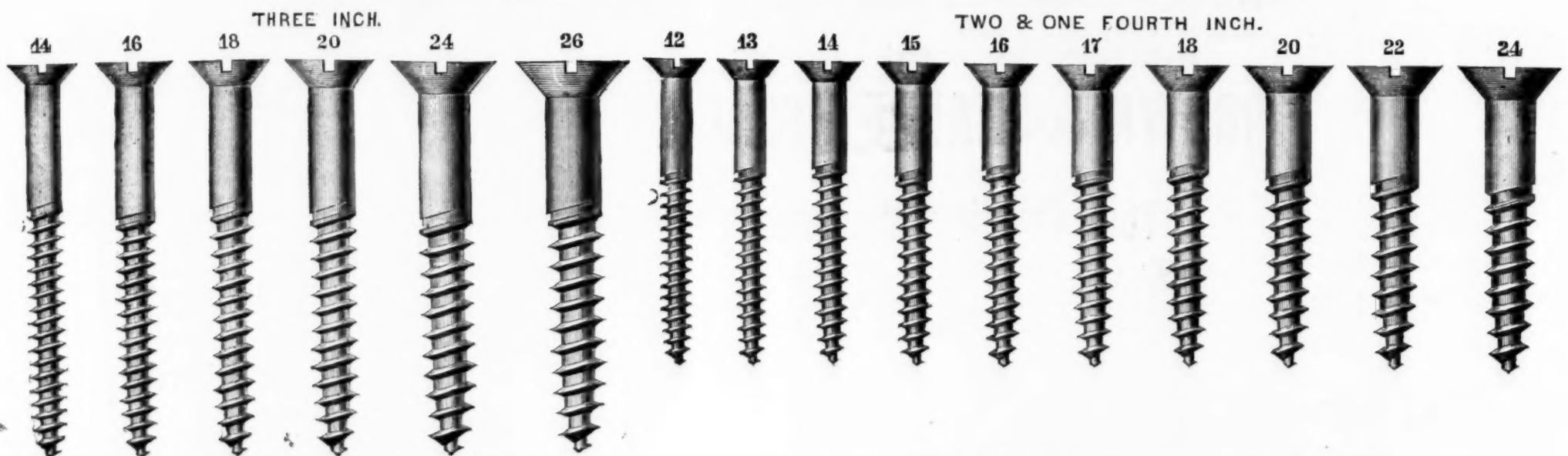
## RIM AND MORTISE DOOR LOCKS, KNOBS, &c.

Particular attention is called to our

### NEW LIST OF DOOR LOCKS, KNOBS, &c.,

issued under date of July 2d, 1877, showing a large reduction in prices; and also new and complete lines of Rim and Mortise Locks, **WITH OUR PATENT ALL STEEL NICKEL-PLATED KEYS.**

## WOOD SCREWS.



**PRICES REDUCED.**

FLAT HEAD, IRON.  
FLAT HEAD, BRASS.

**ASSORTMENT COMPLETE.**

ROUND HEAD, IRON.  
ROUND HEAD, BRASS.



## Cutlery.

## FRIEDMANN &amp; LAUTERJUNG,

Manufacturers of **PEN AND POCKET CUTLERY**,  
Solid Steel Scissors, Shears, Razors,  
Russia Leather Straps, Hones, &c.  
Sole proprietors of the renowned full concave patent  
"ELECTRIC RAZORS,"  
And the celebrated "ELECTRIC SHEARS." Nickel Plated  
Hones.  
Agents for the **BENGAL RAZORS**.  
**AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.**  
91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

## MERIDEN CUTLERY CO

"THE PATENT IVORY" HANDLE TABLE KNIFE.  
MANUFACTURE ALL KINDS OF TABLE CUTLERY.  
EXCLUSIVE MAKERS OF THE  
"PATENT IVORY" OR CELLULOID KNIFE,  
The most Durable **WHITE HANDLE** known. **THE OLDEST MANUFACTURERS**  
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Always call for "Trade Mark" "MERIDEN CUTLERY" on the blade. Warranted and sold by all Dealers  
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GARDNER'S PATENT

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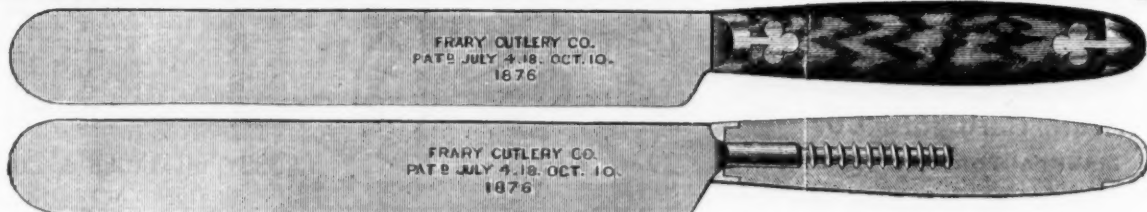
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There is no question but that a solid handle knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day usage. The cement will expand and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent screw tang. A wood screw is welded to the tang of the knife or fork, and screwed firmly and securely in the handle and locked there by the holder, making a very strong neat and handsome knife, which we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butcher and Carvers, and furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly, and very respectfully invite the attention of the trade.

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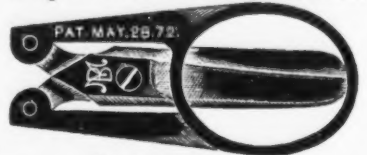
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These Scissors are made of the very best steel, nickel plated, and so constructed that they can be readily folded and carried in the pocket without injury to the contents. A sample pair will be sent by mail, to the trade only, upon receipt of the retail price, namely: For small size, either blunt or pointed.....\$1.00 Large size, pointed or half pointed.....\$1.50 New York, Feb. 1st, 1876.  
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These Shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use, either in the bow or at the junction of back and blade. Samples can be seen at any address, or sample lots furnished. Depot for "THE CROWN" SOLID BOX VISES. A cheap and excellent Vice.

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Choppers, Hand and Power,  
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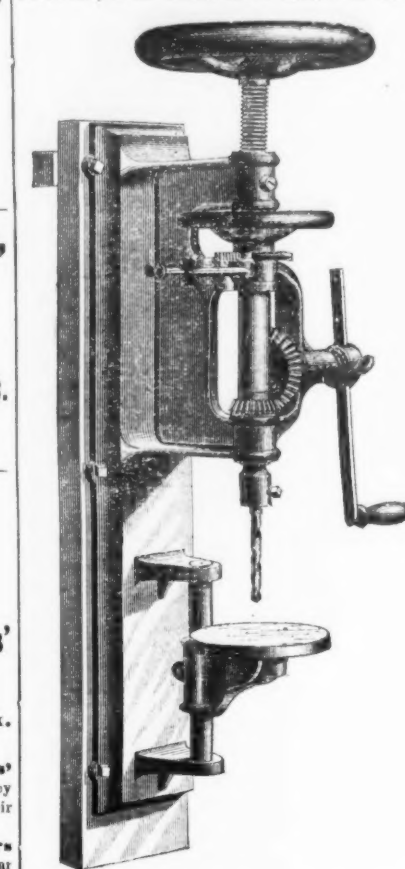
## SPECIALTY.

**COAL WASHING MACHINES AND IMPROVED COKE OVENS.**

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Civil and Mechanical Engineer,  
Cor. Smithfield St. & 6th Ave., Pittsburgh, Pa.

## Upright Self-Feeding Drill for Blacksmiths.

The drill shown in the accompanying illustration is one of the special tools manufactured by the Pratt & Whitney Company, of Hartford, Conn. It is suitable for drilling  $\frac{1}{4}$  to  $\frac{1}{2}$  inch holes in cast or wrought iron. The frame is of iron, cast in one piece, giving the machine strength and stiffness. The platen, or table, has its surface finished in a true plane, and its under side machined to fit nicely a forked arm, to which it is secured by a hardened taper pin. The arm, accurately machined, clamps the lower spindle, on which, by means of a clamp screw, it holds the table at any elevation within its limit of adjustment of 4 to 10 inches from bottom of the



main spindle, holding the table at a right angle to the main spindle directly under it, or at either side.

The feed, having a run of 4 inches, has three rates of speed, which may be quickly adjusted by a thumb-screw. The gears, ratchet and feed cam are cut; the cam roll, pawl and screws are hardened, and the construction throughout is excellent. The crank may be lengthened or shortened at will, and being rectangular, will not turn in the socket when the thumb-screw is loosened for adjustment.

An oil hole in the top of the main spindle connects with channels through which all bearings of the spindle may be lubricated. Tires may be drilled on wheels by resting the felloes on the arm after the table is removed. Pieces of too great height to go between the table and spindle may be drilled on swinging the arm aside and resting the piece on an independent support.

The weight of the machine, as shown in the cut, is 110 pounds. It may be fitted for power by adding a cone pulley of two grades to the crank shaft, at a small extra cost. This pulley will not interfere with the use of the hand crank.

## Improved Lamp Wick Trimmer.

We show in the accompanying cut a device for trimming lamp wicks, which has the advantages usual with labor-saving apparatus of American invention. Unlike most of the trimmers which work on the scissors principle, it cuts from both ends at once, and, working with a guide, secures perfect



evenness and accuracy. It fits any lamp using a flat wick, and is not liable to lose its edge or shape. Mr. James D. Foot, No. 22 Platt street, New York, is agent for the sale of these goods.

London is very proud of its fire brigade. The methods there are so different from ours that it is difficult to make direct comparisons. The number of men in the brigade is now 400; it will probably be raised to 600. There are 49 engine houses on land, and four afloat in the Thames. Instead of having its engines of a uniform character, London has 5 large and 21 small steam fire engines, and also 92 hand engines of various grades. The English theory about hand engines is that they can be set to work quicker than the steam machines. In one particular the London system has an unquestionable superiority; there are 107 fire escape stations and 136 fire escapes, and hence while 123 persons were in danger of being burned to death last year, 88 of them were rescued. The facts about the water supply are curious, the Thames furnishing directly or through canals or docks, three-fifths of the 21,000,000 gallons used by the fire engines in 1876. The supply from street pipes is certainly neither so abundant nor so accessible as the Croton, for at six fires in London last year the water ran short; at 24 fires the "turn-cocks" were late; in ten instances those functionaries failed to put in an appearance. Our fire department is more fortunate in having the hydrants under its own control, and not being obliged to summon a turn-cock.





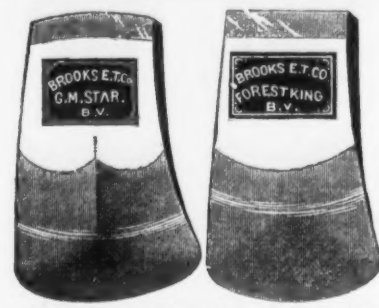
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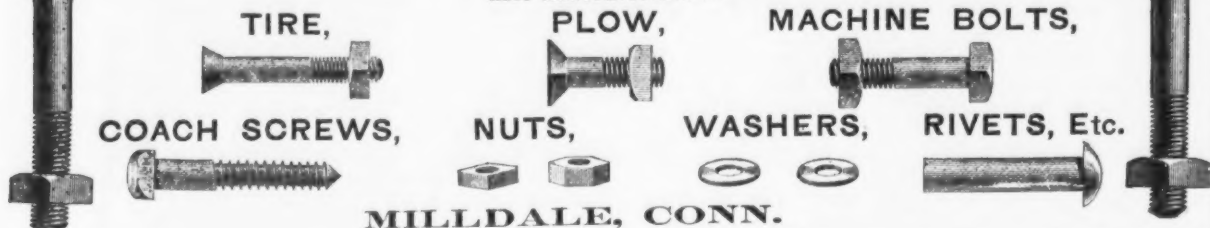
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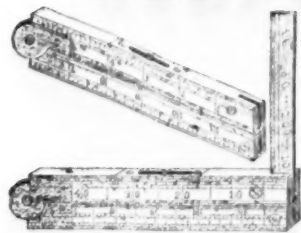
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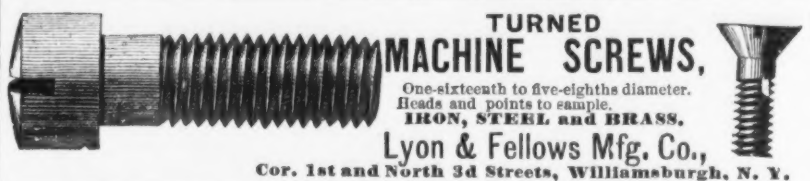
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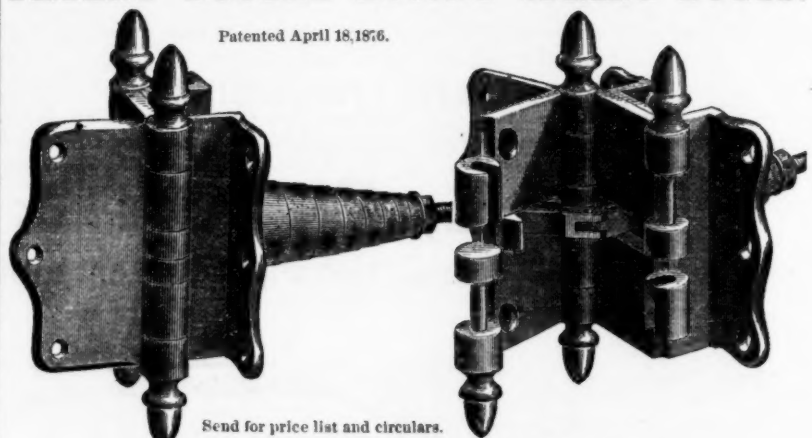
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ANVILS, BELLOWS, VISES, CHAINS, &c.

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## PATENT DOUBLE ACTING SPRING BUTTS.

Patented April 18, 1876.



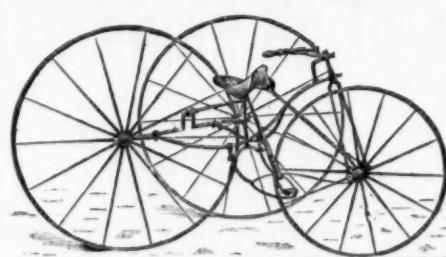
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FOR SWINGING DOORS BOTH WAYS.

These Butts are the first ever constructed with two leaves only, and with flanges attached thereto for fastening to the door and casing, thus rendering them much more substantial and easy to put on, as the screws are all driven from the outside. By means of the flanges the door is hung firmly to the casing, instead of to a strip of iron as in the case with all other double acting Butts, and the screws do not become loose, as the strain on them is much less. On the back of the Butt is a powerful double spring, and draws in direct line with the center of the door, thus holding the door firmly in position, and obviating all sag. Our price list is from 25 to 40 per cent. lower than others. Manufactured by

THE SABIN MFG. CO., Montpelier, Vt.

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Patented in U. S., Aug. 24, 1876; in England, Aug. 19, 1876; in France, Nov. 6, 1876. The SHERIDAN VELOCIPEDS meet every requirement in this line. By its method of construction, entirely different from that of any other Velocipede, it affords invigorating exercise for the whole physical system. Other Velocipedes are propelled solely by the action of the feet, which soon become weary, making the effort to ride painful rather than pleasurable. The Sheridan is propelled by the weight of the body of the rider, together with the feet, transmitting power directly to the axle, as shown in the accompanying cut. The Velocipede is especially adapted to the use of athletic clubs, colleges and schools.

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To avoid the various objections made to the so-called "non-conducting filling"—which, it is complained, causes the iron to be longer in heating, works over on the goods when in use, and takes up moisture and produces rust when not in use—we employ an air chamber below the handle. This air chamber prevents the heat of the iron, in great measure, from working up to the handle, and also keeps the cold exterior air from striking the interior of the iron and cooling the latter too rapidly. With this new improvement, of which we have exclusive control, we are able to offer to the trade an absolutely perfect Sad Iron—one which will heat rapidly, but cool slowly, which contains no material to injure fabrics, which takes up no moisture when not in use, and which, when using, conveys no uncomfortable heat to the handle or hand of the ironer. This is the best and cheapest Mrs. Potts' Patent Cold Handle Sad Iron in the market. Send for Price Current.

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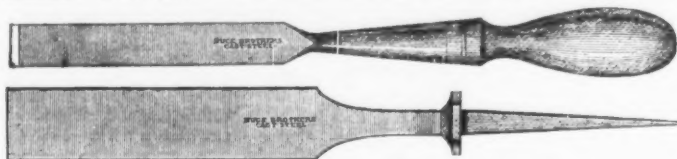
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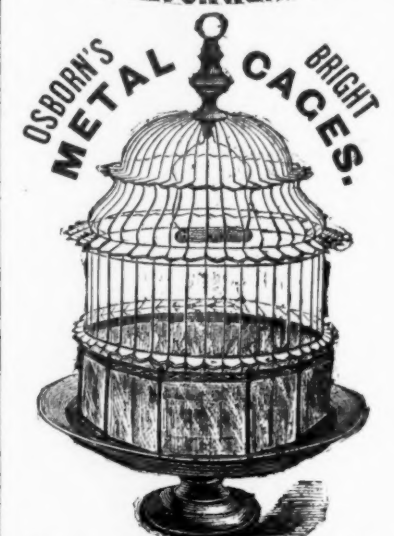


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This stove embodies in its design all the latest improvements in the art of heating, and is the only one of its kind that can be used in any room without the least objection. It is made of heavy iron, and is protected by an ornamental black enamel top, bottom, and sides. Upon the top rests the water tank, which is heated by the fire, and the water is circulated by the action of the pump. It is the only stove of its kind that is safe, economical, durable, and ornamental. See for description of the "Fairy Queen" in the "Iron Age" of January 2, 1877.

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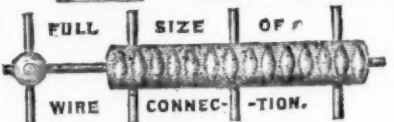


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**FULL SIZE OF WIRE CONNECTION.**



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# The Iron Age.

New York, Thursday, July 12, 1877.

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JAMES C. BAYLES . . . . . Editor.  
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### The Condition of the Iron Trade.

The present condition of the iron trade is certainly as disheartening as it has ever been, with but few, if any, sources of encouragement. A score of times during the past ten years, when prices have been forced down, notwithstanding the most strenuous efforts to prevent it, ironmasters have said, "Surely bottom is reached now;" but there has always a lower depth been found, until now iron and nails are selling lower than ever before in the history of the trade, and at prices, in some cases, that no one is wild enough to claim they can make them at; or, if they do claim it, they are not silly enough to expect anyone to believe them. There seems but three courses left to the individual ironmaster: one is to stop his mill; the second to continue to sell at a loss, making good iron; and the third to make an inferior grade of iron and sell it at the low price. The first requires an unusual degree of moral courage. Every mill owner who reads these lines knows how cheerless, how disheartening a sight an idle mill is, and there are but few sacrifices he will not make to keep the mill running, in part at least. The second is no pleasant, but a strong firm can afford to lose money for a long time and still preserve their credit. A few dollars a ton loss requires a number of months to count up in the thousands, even if a mill runs full, and when it runs only in part, \$20,000 will go a long way. This is the secret of the wonderful persistency of certain mills and certain sections in face of the well known fact that they lose money on every ton of iron sold. It requires a longer time to exhaust money and credit than we are apt to suppose. Mills run on in the vain hope that something will happen to make business suddenly better, and if it does they will be in a position to take advantage of it. It is a fact that large amounts are often made by just this readiness to take advantage of the market. Should a sudden demand arise the wisdom of the policy of continuing in operation will be vindicated, but there is but little hope of any such reaction. The alternative of making bad iron to sell for a price that is as "bad" as the iron sold, is one to which no mill with an established trade can afford to have recourse. It will give any mill that undertakes it a reputation for poor iron that they cannot correct for years, and will cause the iron to be shunned by consumers. Some of this iron will get into structures on the safety of which life and limb will depend, and when they give way and a horror follows, the mill making the iron will get a free advertisement that will not tend to bring many orders to it.

But though working as individuals the ironmasters of the country seem shut up to these disagreeable alternatives collectively. If they will be honest and truthful, each with the other, there is one way out of this trouble, and that is by reducing production by concerted action. There is no use in disguising the fact or assuming to ignore it. There is no salvation to the iron trade until the mills agree to reduce production, and with this there is. The mills that are running the strongest and making the best show at the present prices, will in many cases be the ones that will be in the most pieces when the crash comes. But a large reduction of output would at once advance the price of iron and enable some profit to be made on that which is sold. Is it not the part of sensible men to adopt this course?

### Geometrical Chemistry.

The faculty of the Stevens Institute of Technology have paid a graceful tribute to American progress in science, by conferring the honorary degree of Doctor of Philosophy upon Prof. Henry Wurtz, A. M., for original research, and especially for the discoveries upon which he bases his remarkable theory of Geometrical Chemistry. As this is the first time the faculty have used the power to confer honorary degrees, except to confer that of M. E. upon graduates, and as the faculty which includes such eminent scientists as Morton, Thurston, Mayer, Leeds and Wood were unanimous in the opinion that Prof. Wurtz's discoveries were of sufficient value to merit the highest honor in their gift, the compliment is one of which any man of science might be proud. Prof. Wurtz's theory of geometrical chemistry was, we believe, first outlined in these columns, and we then took occasion to predict for it the recognition since accorded it. Chemists and mathematicians, always conservative in matters of theory, received the new system in silence, and their later approval, given after mature consideration, is the best evidence that a careful examination has revealed in it a substantial basis of truth.

The theory of Geometrical Chemistry is somewhat too complex, and embraces too wide a range to be described briefly. Aside from the theory, however, Prof. Wurtz has discovered a great number of facts in relation to the mathematical relations of molecular volumes—facts which had previously been entirely unsuspected as well as unknown. The first point sought by Prof. Wurtz was a standard temperature in Nature. This he very conclusively demonstrates to be the temperature of ice at the point of incipient fusion. This found, the first fact discovered was that the volumes of all single chemical molecules, with one exception, are expressed by quantities which have the relations of even cubes of whole numbers. The one exception

is oxygen, the molecular volume of which, deduced from a comparison of water with peroxide of hydrogen, is 5184, or three times the cube of 12. Calculations made upon an immense number of density determinations, fail to show that oxygen ever changes this volume—or diameter, as it is perhaps more appropriately called. Another discovery is the fact that hydrogen is the most variable of all the elements. It is found that molecules which combine to form a new substance, tend to assume very nearly the same size. Again, the tendency to vary increases with the electropositive nature of the element. Later researches develop the fact that, in many different series of compounds, the diameters of some one element or elements vary in different members of the series by four units. The significance and importance of these facts alone are enough to render Professor Wurtz's labors worthy of high honors. What was at first regarded by some as singular coincidences in numbers, is now seen to be beyond the possibility of mathematical doubt. The facts discovered seem to give us a key to the philosophy of chemistry. Already some classes of substances, which have long defied the efforts of chemists to classify them rationally, fall into natural relationships depending upon the diameters—cube roots—of certain elements. We have personally gone over some thousands of figures relating to this subject, and have been surprised to find that the larger the number of volumetric determinations used for comparison, and the greater the accuracy of the experiments, the more closely did the theoretical and experimental figures agree. In complex as well as simple compounds there is the same close correspondence. The new field thus opened for investigation and research is most promising and interesting, and the results already obtained are of the highest value in establishing the relationships among a great many classes of substances in regard to which chemists have never been agreed.

### An Unnatural Outgrowth of Trade Unionism.

If ever a series of murders was committed without a shadow of excuse, or even palliation, it was that that ended in the execution of eleven of the so-called Mollie Maguires on the 21st ult. The details of the causes of these murders, the brutal animal revenge for slight personal injury that was the producing cause, the deliberation with which they were planned, the horrible mockery of justice with which the different divisions of the order, on *ex parte* testimony, decided that the grievances of the Mollies were sufficient to require the death of the accused, and the allotting of the murderers by other divisions of the order, as an act of friendship to be repaid on demand—all put these murders out of the catalogue of ordinary crime and place them among the *causes celebres* of criminal annals. One who has read these details even cursorily would scarcely believe it possible that an apologist could be found for these crimes and an indirect, if not direct, justification of them. But such is the fact. To show this, read the following extracts from an article in a journal published in the interest of labor: "The coal companies have driven the 'miners mad. Eleven were caught and 'hurled into eternity to satisfy the rapacious demands of justice.' Are the demands of justice 'rapacious' when they ask that such crimes as those for which these men were executed meet their just punishment? Is 'rapacious' a good adjective in this place?"

Again the same journal says: "The outrages perpetrated by the miners bear 'scarcely any proportion to the wrongs perpetrated on them.' Does this mean that the murder of policeman Yost bears scarcely any proportion to his arrest of Thomas Duffy—that is, that the 'outrage' of the murder by the miner was less than the wrong perpetrated on the miner by his arrest for drunkenness and disturbance of the peace? But a question comes in here: What were the wrongs perpetrated on the men who murdered Yost? These men had never seen him, and he had to be identified to them in order that they might commit the murder. If the whole list of murders were gone through with, it would be found that the wrongs perpetrated on the miners, that were the producing cause of these murders, were similar to the above.

We do not wish to charge these crimes on the individuals composing labor unions, but we do not hesitate to say that they are the legitimate and logical result of the claims and asserted rights of these unions. They not only claim the right to say for what wages men may work, but they also claim that no one else shall work for any less wages, and should anyone, no matter what his necessities, work at a rate less than that fixed, he is branded as an outcast, and is practically regarded as an excommunicated heretic was in the middle ages. There is a further so-called right which they claim that is still more destructive of all true right and justice, and that is, if a man fits himself to occupy a certain position he has a right to that position. That we not be accused of misrepresentation, we quote from a labor organ: "A man when he fits himself to perform certain work has a certain right to it." If this is a correct proposition, then, he has a "right" to prevent anyone from taking it away from him or preventing him from working at it, and there is but a step from this to the right to

murder a mining boss for discharging him. Among the class of men who largely make up the miners, an assertion like that we have quoted, once accepted, would naturally lead to the justification of murder in the event of a discharge from work; and this seems to have been just the view that was taken by the divisions. Saenger, the mining boss, discharged a miner. The miner complained to the division, and it was decided that Saenger must die, for he had deprived the miner of his rights. There seems to us no question but that such outrages as these are the legitimate results of trade unionism as it is conducted in this country.

### Does our Government Need to Send Abroad for Armor Plates?

The following item, which appeared in the *Philadelphia Press*, is obtaining some currency:

A board of naval constructors and engineers, Rear Admiral Mullaney, president, appointed to consider the advisability of completing the iron-clads at Roach's shipyard, has recently been in session at Chester. It is expected that it will recommend to the Navy Department the speedy completion of the monitors at the yard in all the details, and will also recommend the erection of a suitable mill for the fabrication of heavy armor plates of from ten to eighteen tons each, we at present being entirely dependent upon the English manufacturers for this class of material. A mill to furnish plate iron for armored vessels is required, but the necessary outlay of capital would hardly be justified unless encouraged by the general government. In the event of receiving this encouragement, Mr. Roach proposes to erect a large mill at his yard, at Chester, or enlarge the rolling mill at South Chester.

This calls for partial contradiction at least. It is a fact well known to the iron trade and the Navy Department, that in 1864 Messrs. Moorhead & Co built just such a mill as the one now proposed, and that armor plates were rolled on it 3 to 12 inches thick, up to 5 feet wide and 12½ to 20 feet long, and this did not test the capacity of the mill. The mill is still standing, and with a few weeks notice could be prepared to furnish anything in the line of armor plates that can be made in England or elsewhere. One of the members of the firm has lately returned from England, and is fully aware of the capacity of the English plate mills. We have his authority for the statement that whatever can be done abroad in this line can as well be done at home.

In a word, there is no need of importing plates from England or elsewhere, or of government aid to build a mill at Chester as proposed. The Pittsburgh mill has been idle for years, because there was no demand in this country for the plates it was capable of making. The existence of this mill and the work it has done are matters of record in the Navy Department, and it is certainly due Messrs. Moorhead & Co. that the fact be recognized that they have, by their private enterprise, built a mill to do this class of work. There is no possible objection to the construction of an armor plate mill at Chester, if Mr. John Roach is willing to make the investment. We decidedly object, however, to any attempt to create public opinion in favor of a government appropriation to that end, under the mistaken idea that the needed facilities are not at hand and cannot be had in any other way. Mr. Roach is an enterprising shipbuilder, but as private capital has already anticipated the proposed movement, it is not necessary to furnish him capital out of the national treasury to build a plate mill which is no more a necessity just now than is a new blast furnace to make iron from which to roll armor.

### What Else Can They Do?

Under this title the *Labor Tribune* of July 7th defends the course of the striking iron workers in the Allentown district. After quoting our recent editorial remarks on the strike, and the deplorable consequences which must certainly follow it, the *Labor Tribune* says:

Will *The Iron Age*, from which we quote, tell us what else workmen can do but strike? If a committee go to the proprietors they are either basely insulted, the committee discharged, or else not given an interview at all. Reductions are made without notice. If the men ask to arbitrate, they are laughed at. If they object to any of the many unjust arbitrary rules, they are discharged. The men are driven to strike; there is no other resource—no other remedy. They are treated as cattle. The manufacturers always rely upon non-union men to take the place of strikers. They care nothing for position. They care nothing as to how men live, whether they live on rice or rats, or even decently subsist. Nowadays every man is his own demagogue. A wife and children, a miserable home, work half time, and at low wages, will make any man something more than a demagogue, and he does not wait for some stirring appeal from one of his class. The manufacturers of this Allentown district are among the most unreasoning and tyrannical in the United States. They have the most unjust and oppressive mill rules that were ever written. They drive their men into rebellion. They make striking a religious duty. The present state of the iron trade is not so bad as this paper would have us believe. The Eastern manufacturers need a good first-class strike. They have been undercutting their Western competitors long enough.

Of course, rather than submit to snubbing when they impudently attempt to dictate to their employers how to conduct their business; or conform to rules different from those which would be enforced if they had the making of them, the men should strike. It is much better to stand on one's dignity

and depend on charity to keep one's self from starving than to work for an employer who requires one to mind his own business and is arbitrary in the enforcement of general rules. Of course, those who now voluntarily abandon work only make room for others who are willing to conform to rules, and who do not put themselves in a position to be snubbed by their employers. Probably those who come in are better men than those who go out, and are glad to get the chance to earn their living; but the strikers invite our admiration as they stand on their dignity, with idle hands in empty pockets. Perhaps during the coming winter, when they hold out these same idle hands with an appeal for undeserved charity, they will realize that they have acted like fools, and brought upon themselves and their families misfortunes which are greater than they can bear unaided.

Few things are more pitiable than to see our workmen, strong handed and kind hearted, drugged with the poison of false teachings and led to their ruin by the self-seeking demagogues who fatten upon their miseries. Oh, for a Moses, great of heart and strong of arm, to lead this army of honest, well-meaning workmen out of the worse than Egyptian bondage into which they have fallen, and expound to their simple understandings the immutable laws which govern all exchanges, whether of commodities or of services. No nation ever lived under a tyranny so absolute as that which labor exercises over itself, and no tyranny ever pursued its victim into his home and social life with a persistence so unrelenting as that with which a union pursues the individuals who compose it. Who shall lead the masses of labor in successful rebellion against this dark oppression, and secure for the workingman the right to earn his daily bread as and when he can, and to eat it in peace?

### Reports of the United States Commissioners to the International Exhibition at Vienna, 1873.

It has not been forgotten that, by authority of Congress, the President appointed a commission of scientific men, and also a commission of "artisans," to visit the International Exhibition held at Vienna in the year 1873. These commissions were instructed to report to the President on their return, giving an account of such matters as they should consider worthy of publication by the government. These reports were, in some cases, not presented by the authors until three years had elapsed from the close of the Exhibition. The whole collection was finally placed in the hands of an editor by Mr. Fish, then Secretary of State, in whose charge the matter had been placed by the President, and, a few months later, they were published at the government printing office and distributed to members of Congress, from whom they are to be obtained by a favored few among their constituents. Those who cannot expect favors of this kind from their representatives, may, if they are fortunate, either secure them from the Department of State, from which sets are distributed to libraries to prominent individuals who are known to be capable of making good use of them, or by purchase in the shops of booksellers having facilities for obtaining them from congressmen who are more interested in the politics of their districts than in their enlightenment.

We have already briefly noticed the issue of this important work, and now will endeavor to fulfill our promise to give a somewhat full abstract of those reports which are likely to have interest for our readers.

This great mass of material, which now fills four large volumes and covers about 3500 pages of the large octavo size adopted for public documents, was entrusted to Prof. R. H. Thurston as editor. He has classified the reports under several heads, as agriculture, science and education, engineering and architecture, and metallurgy. The first volume, which contains the reports on agriculture, also contains a collection of exceedingly interesting and valuable translations of the reports of foreign commissioners to the Exhibition, in which the American exhibitor is permitted to see himself as others see him, and from which some profitable lessons may be learned. As remarked by the editor:

"It is a subject of congratulation, and 'will be a source of real pleasure, to every citizen of the United States, that these criticisms are so generally favorable. They are even, in fact, more favorable than they at first glance might appear. In reading them, it is to be remembered that the foreign writer—born and bred in distant countries, under influences with which the citizen of the United States is unfamiliar, and from which he is, fortunately, free, accustomed to habits of thought, and familiar with methods which are equally strange to those who see the work he criticizes, viewing the subject of his criticism from an entirely different standpoint, and through a medium of a very different hue—must necessarily be placed at some disadvantage. He cannot be expected to see the real value of American methods or of American productions, taken apart from the peculiar circumstances which have brought them into existence. The real bearing of the distinctions arising between the older nations of the Eastern Continent, which are slowly progressive, stationary, or even retrograde in their changes—in which the conservatism and tradition have



"almost absolute away; in which ambition is stifled, before the citizen reaches the age of manhood, by the evident and almost absolute impossibility of advancement, except as the death of those already enjoying them opens new opportunities at home; and migration to another land is the only alternative with a life of laborious poverty and obscurity; where every effort at progress is difficult; and the young nation which is barely a century old, and in which ambition, energy and character have open field and a full reward, is not, and cannot be, appreciated by those who have seen and felt only one of these two opposite sets of conditions. Still less is it possible for the man who has been subjected to the one to criticize the methods and the work of him who has labored under the other, until he has seen and felt and intelligently studied the circumstances controlling the latter." \* \* \* \* \* It is to be remarked that the views of European reporters are fair, and generally favorable, in tone. It seems evident that there exists among the influential classes in Europe, as well as among those less favored, a feeling of decidedly friendly prejudices, which even the radical differences of circumstance and training alluded to above has not seriously repressed."

Among these foreign reports we find most flattering notices of the work of Sellers & Co., the Brown & Sharpe Mfg. Co., Pratt & Whitney, Stiles & Parker, B. D. Whitney, the Morse Twist Drill Co., and other tool builders; of Tilghman, Hall, West, Miller, Knapp, Bigelow, Covert, Felt, and other inventors; of our builders of agricultural implements and of firearms, and long accounts of the wonderful development, and still more wonderful extent, of our mineral resources, and of the magnitude and variety of our manufacturing industries. There are some sharp criticisms of our systems of education and of our methods of instruction, by which it is to be hoped we may profit.

The editor has prepared an introduction to the reports, which is given a place in this first volume, in which he describes the origin of international exhibitions, in the fairs of the Middle Ages, their gradual growth in extent and importance, until they furnished marts for the exchange of goods in Europe from all parts of the then known world. They finally became properly representative of all nations, and the plan of a professedly International Exhibition, first proposed by M. Boucher de Perthes, about 1804, was finally carried into effect by the London Society of Arts, under the presidency of Prince Albert, in 1851.

The editor describes the earlier exhibitions with some minuteness, and then gives a very complete account of the inception, organization and results of the great Exhibition at Vienna. With all that related to the latter our readers are already more or less familiar. Not so, however, with the reports of the distinguished gentlemen who represented the United States in the several departments of industry and science. These reports contain an amount of valuable matter the real importance of which can only be appreciated after long and careful study.

Volume I contains but two reports of American scientific commissioners: Those of Dr. Warder on forestry and of J. R. Dodge on sheep and wool. These are not of special interest to our readers, and we need only state that Dr. Warder's report is a somewhat extended and very complete account of the methods of forest cultivation in Europe, and of the system of legislation, as well as of the forest products exhibited in such striking profusion at Vienna. Every agriculturist should read this report, and the average citizen, and especially every legislator, should read the introduction, in which we find the following: "It is high time that our national legislature should turn its attention to the prevention of these evils" (the destruction of our forests and the public calamities which will inevitably follow) "before some of the fairest portions of our country become barren wastes, before the navigation of our rivers is impaired in consequence of their irregular floods and their frequent low water, and before their channels are obstructed by the material that is washed down from their banks and the neighboring hills. These declivities should be kept clothed with forests to a much larger extent than the cupidity of a man has permitted in his desire to extend the cultivable area of his farms." He is certainly right in his statement that the subject should receive vastly more attention than it has hitherto from our agriculturist and our statesmen.

Dr. Warder would have placed us under still greater obligations had he also included in his report a detailed and complete account of the principal schools of forestry in Europe. Very few of our people have ever even thought of the policy of founding such schools, and still fewer have known that for years the more advanced statesmanship of Europe has maintained such schools, as they have all other kinds of technical schools, at public expense, and with all the advantages to be anticipated from such far sighted policy.

The report of Mr. Dodge, who is the well known and efficient statistician of the Department of Agriculture, contains some valuable statistics of the wool manufacture, as well as of production, in the United States, for which we are compelled to refer our readers to the report itself. We notice, however, that the growth of manufactures has been much greater than in the produc-

tion of wool, the former having increased 100 per cent. since 1850 and the latter but 33 per cent. We also note the very gratifying fact that the increase in value of manufactured woolen goods has been very much greater than the increase in weight of product—about 400 per cent. in the same period. This means healthy and prosperous development.

The Governor of Pennsylvania has announced the following named gentlemen as Inspectors of Mines for the bituminous regions of that State, under the Ventilation Bill passed at the last session of the Legislature: William Wilcox, Allegheny county; J. J. Davis, Armstrong county, and William Richards, Tioga county. A board of examiners, out of a large number of applicants, recommended to the Governor the names of sixteen who had exhibited the necessary qualifications for the discharge of the duties of the office. As we stated some weeks since, quite a pressure was brought to bear in favor of certain candidates of the miners' conventions, but the Governor seems to have paid but little attention to these recommendations. Some of those appointed appear to have the confidence and good will of both miners and operators, while some of the others recommended based their claims for support on the ground that they had incurred the ill will of the operators.

**Death of a Well-known Merchant.**—Mr. David S. Brown, the head of the well known firm of David S. Brown & Co., of Philadelphia, died on the 6th inst. at his residence on Walnut street, above 17th, after a long illness. Mr. Brown was born in New England in the year 1800. He came to Philadelphia in early life and has always been one of the leading merchants of the city and one of its most active and enterprising business men, the firm of which he was the head being one of the principal dry goods manufacturing and commission establishments of the country. He was largely interested in real estate and manufactures in Gloucester, and was the principal owner of the Washington Manufacturing Company's and Ancona Printing Company's works in that city. He was also largely interested in the Gloucester Gingham Mills, the Gloucester Iron Works, the Gloucester Pottery, the Gloucester City Savings Institution, the Gloucester City Gas Light Company, the Camden, Gloucester and Mount Ephraim Railway Company, the Manufacturers' Land and Improvement Company, of Gloucester, &c.

#### The Railroads of the United States in 1876.

We take the following from the introductory chapter of the "Manual of the Railroads of the United States for 1877-78," just issued by Messrs. H. V. & H. W. Poor, of this city. To this work we are also indebted for some of the figures given in our article of last week on "Railroads in Europe and America." This great work is unquestionably the most valuable of our statistical annuals, and should be in the library of every business man:

Though the past year has been one of great depression in the railway, as in all the other interests of the country, the aggregate results of their operations have been fairly satisfactory. The number of miles of railroad opened during the year 1876 was 2856, against 1919 miles for 1875 and 1911 miles for 1874. The excess of miles built, as compared with the two preceding years, is due almost entirely to the great activity in the Southern Pacific lines, and in narrow gauge lines in Ohio, Texas and Colorado. No new lines of any considerable magnitude have been undertaken. The tables which follow will show in what sections there has been any considerable increase.

The gross earnings of all the roads whose operations have been reported, have equaled \$497,257,959, against \$503,065,505 for 1875. The general result of the operations of our railroads for the last six years is shown in the following statement:

STATEMENT SHOWING MILES OF RAILROAD, CAPITAL ACCOUNT, EARNINGS, ETC., FOR SIX YEARS.

Year.	Miles Operated.	Capital and Funded Debt.	Gross Earnings.	Net Earnings.	From Freight.	From Passenger.	Dividends Paid.
1871	44,614	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000
1872	44,614	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000
1873	44,614	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000
1874	44,614	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000
1875	44,614	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000
1876	44,614	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000	\$1,000,000,000

It will be seen by the above that, while the gross earnings have fallen off \$5,807,546, the net earnings have increased \$946,314. This increase has been due chiefly to the great economies practiced in conducting the operations of the roads. Whether these economies have been at the expense of the condition of the roads, the future must determine. The introduction of steel rails has doubtless been a considerable element in the cheaper rate of operating expenses.

There were in operation, at the time of the issue of the first Manual for 1868-69, being for the year ending December 31, 1867, 39,276 miles of railroad, of which 3938 miles were in New England, 9555 in the Middle States, 15,226 in the Western, 10,126 in the Southern, and 431 in the Pacific States. The Union and Central Pacific Railroads had not been completed. There was not a mile of railroad in Utah, Dakota, Colorado, Washington Territory or the Indian Country, where now are 2136 miles; and in all the territory west of the Mississippi River and east of the Pacific slope, where now are 17,576 miles, supplying the wants of a population of 7,120,000, there were then but 3968 miles of railroad, with a population of 4,205,000.

Arranged by groups, the increase of railroad mileage and population is shown in the following table:

TABLE SHOWING THE INCREASE OF RAILROADS AND POPULATION IN THE UNITED STATES FOR TEN YEARS, 1867-1876.

Group.	1867.	1876.	Per Cent.
Total U. S.	39,276	77,470	97.25
New England States.	3,938	5,694	44.59
Middle States.	9,555	15,226	58.30
Western States.	10,126	15,226	50.37
Southern States.	431	1,012	135.27
Pacific States.	—	431	—

It will be seen by the above that, while in the last 10 years the railroad mileage has nearly doubled, the increase in population has been only 23 per cent., the railroads having increased more than four times as rapidly as the population. The number of inhabitants to a mile of railroad in 1867 was 925, while in 1876 it was only 577. The experience of the New England States demonstrates that, to enable railroads to be operated at a profit, a population of at least 500 to a mile of railroad is necessary in this country. The history of the railroads in the Western States also proves it. In the earlier days of the system, nearly all the lines built in the Western States brought handsome returns to their builders; but with the increasing profits came a still greater increase of railroads. The success which attended them led to an enormous development of the system. The methods of building were also changed, and the depression which has attended their operations during the last three years is largely owing to the undue stimulus which the first successes created. In the Western States, in 1867, there were 787 inhabitants to a mile of railroad, in 1876 there were but 427 inhabitants to a mile. The inevitable result has followed; and that result cannot be overcome until the population shall again increase to the necessary proportion.

In the first issue of the Manual, in 1867, this result was clearly foretold, although the fact has exceeded the anticipation, both in time and amount. We then said: "The annual mileage of railroads is likely, for some time to come, to exceed in ratio the increase of population. From 1870, the increase of the latter may be estimated at 1,000,000 annually; while the number of miles of railroads constructed will probably equal 2000 annually. Their construction will be prompted by consideration of the advantages to be derived from them in promoting the industries, and in facilitating the social intercourse of the people, rather than by any direct income they may yield."

The statement concerning population and the income of our roads has been verified; but in respect of the increase of railroads constructed, instead of 2000 miles a year, we have had since 1870 a yearly average of over 4000 miles, compressing into six years what, under the circumstances, seemed extravagant for 12 years, and thus giving us a growth of population and resulting business of only 6,000,000, instead of 12,000,000 people, as then estimated.

Since 1854, there has been an increase in railroad earnings of 50 cents per capita per annum. The net earnings for 1876 were \$186,452,752. Had the progress of population kept pace with that of railroads—or rather had we restrained the progress of our railroads to the progress of population—the net earnings would have exceeded the present amount by over \$25,000,000, or equal to a revenue of 6 per cent. on \$420,000,000—sufficient to have saved from default the greater part of the more important lines which have been obliged to forego the payment of interest on their funded debt.

The earnings from transportation of freight, mails, etc., for the year 1876 were over 197,082,000 tons of freight. As compared with the previous year, the tonnage transported shows an increase of 6,072,000, while the freight earnings shows a decrease of \$2,822,858. This decrease is wholly due to the great reduction in the rates of transportation. This reduction has been steadily going on for the last five years. In Massachusetts—which presents a fair average for all New England—the reduction has been from 3.11 cents per ton per mile in 1871 to 2.04 per ton per mile in 1876, while the quantity of freight moved has increased from 8,934,104 tons in 1871 to 11,327,502 tons in 1876. In Ohio, which also presents a fair average for the Western States, the reduction has been from 1.82 cents per ton per mile in 1871 to 1.12 per ton per mile in 1876,

while the amount of freight moved has increased from 18,554,340 tons in 1871 to 29,348,799 tons in 1876. In New York, which fairly represents the Middle States, the earnings per ton per mile have decreased from 1.77 cents in 1871 to 1.19 cents in 1876, while the freight moved has increased from 14,174,544 tons in 1871 to 22,891,828 in 1876. The results are shown in the following table:

State.	Tons moved.		Rate per ton per mile in cents.	
	1876.	1871.	1876.	1871.
Mass.	11,327,502	8,934,104	2.04	3.11
N. Y.	22,891,828	14,174,544	1.19	1.77
Ohio	29,348,799	18,554,340	1.12	1.82
Total	63,568,129	41,662,988	1.93	2.70

At the same ratio of decrease throughout the country (36.6 per cent.), the earnings from freight transportation are less, by more than \$132,000,000, than they would have been had the rates of 1871 been maintained. Since that time, \$2,000,000,000 have been invested in railroads in the United States, and 25,000 miles of railroad constructed. Yet with this enormous reduction in the rates of transportation, the railroads have yielded for 1876 a net return of over 3 per cent. on the capital invested.

The growth of our railroad system, in all its branches, in the last ten years, is shown in the following comparative table of railroads whose operations were reported, compiled from the first and the present issues of the Manual:

STATEMENT SHOWING MILEAGE, COST, OPERATIONS, ETC., OF RAILROADS IN THE UNITED STATES, FOR THE YEARS 1867 AND 1876.

Year.	Miles in operation.	Annual increase of mileage.
1867	39,276	—
1868	40,000	724
1869	40,800	800
1870	41,600	800
1871	42,400	800
1872	43,200	800
1873	44,000	800
1874	44,800	800
1875	45,600	800
1876	46,400	800

Decrease.

The decline in the amount of earnings of our railroads from 1873, the year in which they reached their highest point, is by no means so remarkable as its long continuance. The depressed condition of these works only reflects that of the whole country. The agricultural interests have suffered the least, for the reason that with low prices the demand for their products in other countries is practically without limit. There are no markets to take off in the same way those of our manufacturing industries. As these were stimulated to an extraordinary extent by the paper money of the country, they have suffered in an equal degree from the decline in prices as this money rose in value—a healthy though a severe and often a dangerous process. The proposition for resumption of specie payment has necessarily excited an extraordinary influence in reducing expenditures of all kinds by way of preparation for an event, the full effect of which could only be a matter of conjecture. Whenever an apprehension is created, all business operations will be carried on with great caution, and expenditures of all kinds reduced to their minimum. The depressed state of the country is the natural result of preparation for the passage from one condition to another. The misfortune in the present case is, that its restoration does not depend so much upon the operation of the laws of trade, as upon the action of the government, which has imposed upon it an inconvertible currency which all believe must give place to a convertible one, as a necessary condition of a sound and continued prosperity. There can be no doubt that the country is well prepared to begin the work of resumption; nor that the moment adequate steps are taken in this direction it will enter upon a period of prosperity such as has never before been witnessed. All social disturbances have been quieted. The country is rapidly becoming a political as it is a commercial unit. The present period of depression has tended more than anything else to secure to our railroads complete supremacy so far as the internal commerce of the country is concerned. The reduction which has been effected in the cost of transportation has enabled them to supersede almost wholly its great navigable water lines, as well as ocean transportation between its different sections. The interchange of merchandise between the extremes of the Union, between the Gulf and the Northeastern States, is now almost wholly effected by means of these works, as is very largely that between the Pacific and Atlantic slopes of the continent. All that is wanting, therefore, to secure their restoration to the highest condition of prosperity which they have yet enjoyed, is a definite policy in reference to the currency. It was hardly to be expected that near the close of an administration, and pending the election of a president, adequate steps should have been taken. So far as government is concerned, no further delays are to be expected. With such measures only entered upon, so that our people could count with some degree of certainty upon the future, an activity would at once manifest itself in striking contrast with the inertness which has so long prevailed. By

the close of the year our population will be fully four millions greater than it was when the great crisis of 1873 took place. The rate of its increase equals at least 24 per cent. annually. The rate of increase of their productive capacity is at least two-fold greater. These facts show the provision that has been made for the future during the period of depression which has prevailed. The country was never better supplied with all subjects of consumption and commerce. The greater part of its industries are still actively employed.

In the meantime the depression itself has not been without its uses. It has necessarily led to the utmost economy in the management of our railroads, and to the adoption of every method by means of which cost of transportation has been reduced nearly one-half within a period of five years. With an improvement in the general interests of the country, its railroads will be in a position to take advantage of it, as they have never before. There is no interest so closely identified with all the operations of society, none so certain of support, and none which with a reasonable degree of general prosperity can be made more productive. There is every appearance that the period of the greatest depression has been passed; a depression which uncertainty and apprehension have had no small share in producing, and which must disappear so soon as these are removed.

STATEMENT SHOWING THE NUMBER OF MILES OF RAILROAD CONSTRUCTED EACH YEAR IN THE UNITED STATES, FROM 1830 TO THE CLOSE OF 1876 INCLUSIVE.

Year.	Miles in operation.	Annual increase of mileage.
1830	23	—
1831	95	72
1832	230	135
1833	380	150
1834	633	253
1835	1,008	375
1836	1,273	265
1837	1,407	134
1838	1,913	506
1839	2,302	389
1840	2,818	516
1841	3,535	717
1842	4,020	485
1843	4,815	795
1844	4,777	102
1845	4,033	256
1846	4,930	897
1847	5,308	378
1848	5,096	368
1849	7,305	1,309
1850	9,024	1,666
1851	10,762	1,738
1852	12,908	1,946
1853	15,360	2,452
1854	16,720	1,360
1855	18,374	1,654
1856	22,019	3,645
1857	24,503	2,484
1858	26,789	2,286
1859	30,335	3,546
1860	31,280	945
1861	32,120	840
1862	33,170	1,050
1863	33,908	738
1864	35,085	1,177
1865	36,827	1,742
1866	39,276	2,449
1867	42,555	3,279
1868	47,268	4,713
1869	52,808	5,540
1870	60,568	7,760
1871	66,735	6,167
1872	70,784	4,049
1873	72,995	1,911
1874	74,614	1,619
1875	77,470	2,856

A question of considerable importance to all manufacturers of machinery has been referred to the Attorney-General for an opinion by the Secretary of the Treasury. It is, whether machinery, a small part of which is of steel, and which is purchased and invoiced separately from the other parts which are of iron, is dutiable as a manufacture of which steel is a component part. The question was brought to the attention of the Secretary of the Treasury in connection with the importation of iron mules and steel spindles by New England manufacturers. The department ruled some time ago that such machinery was dutiable as being composed of all steel, and from this decision an appeal was taken. The duty on steel is 45 per cent *ad valorem* and on iron 35 per cent *ad valorem*, and a considerable amount of money is involved.

The Manchester Locomotive Works, New Hampshire, have purchased from the Amoskeag Manufacturing Company all their right, title and interest in the celebrated Amoskeag steam fire engine. This engine is one of the most popular steam fire engines that ever came before the American people. It carries away the palm wherever it is put in competition, and has never been known to fail in a single instance. We are glad that a company standing so high as the Manchester Locomotive Company have secured these invaluable patents, and we have no doubt they will be pushed with all the vigor and business enthusiasm which characterized the Amoskeag Company. The Manchester Locomotive Company is one of the leading industries of the State of New Hampshire; they employ a full force of men, and are driving a very successful and lucrative business.

The long contested case of Prevost vs. Gorell was brought to a termination on Saturday in the United States Court at Pittsburgh. The parties own and operate adjoining coal mines in the anthracite region, and the defendant, it was claimed, so drained his mine as to throw large quantities of water in and upon the mine of the plaintiff, who had to pump it out, or get rid of it otherwise, at a large outlay of money and injury by interruption to his mining operations. The case was taken up on the 22d of May last, and has lasted over nine weeks. The jury returned a verdict in favor of the plaintiff for \$128,808.41.

Opposition to machinery is still manifested in England to some effect, if we may believe a story published in *Capital and Labor*, an English newspaper, which says that an American machine for making wheels to gauge was introduced in a coach building establishment there, but that, under trade union rules, the men were ordered not to work it. The machine was accordingly abandoned, and the wheels themselves made on similar machines, imported from this country. The same paper also mentions as a "curious fact" that some of the English carriages exhibited here last year were mounted upon American wheels, and the *Scientific American* says that large numbers of wheels are thus imported, which might have been made in England but for the opposition of trade unions to the use of machinery.







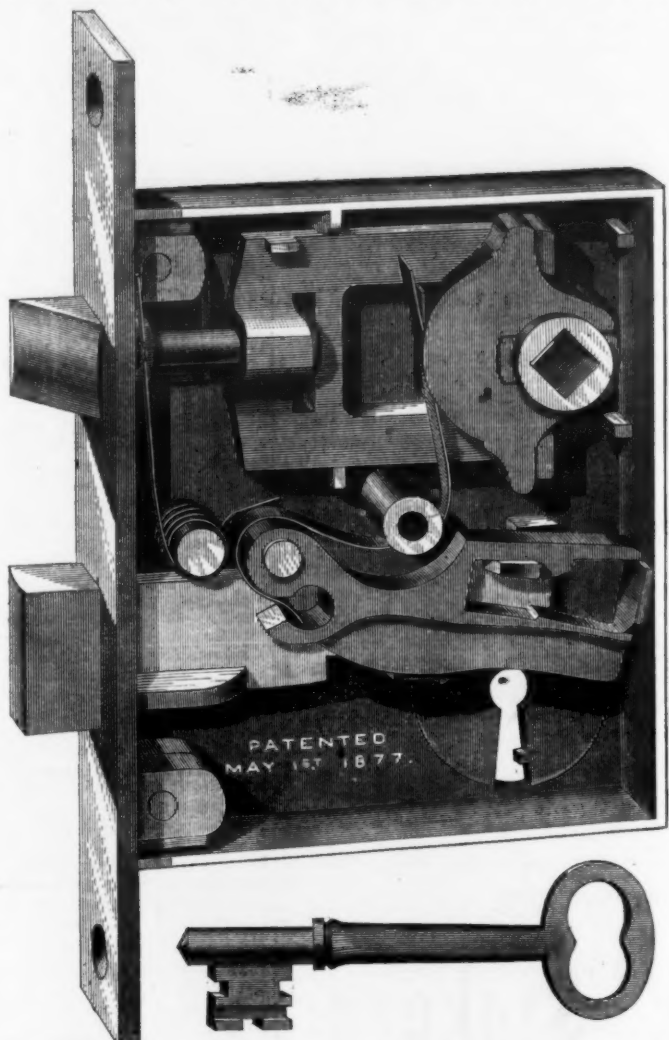
# P. & F. CORBIN,

## MANUFACTURERS OF

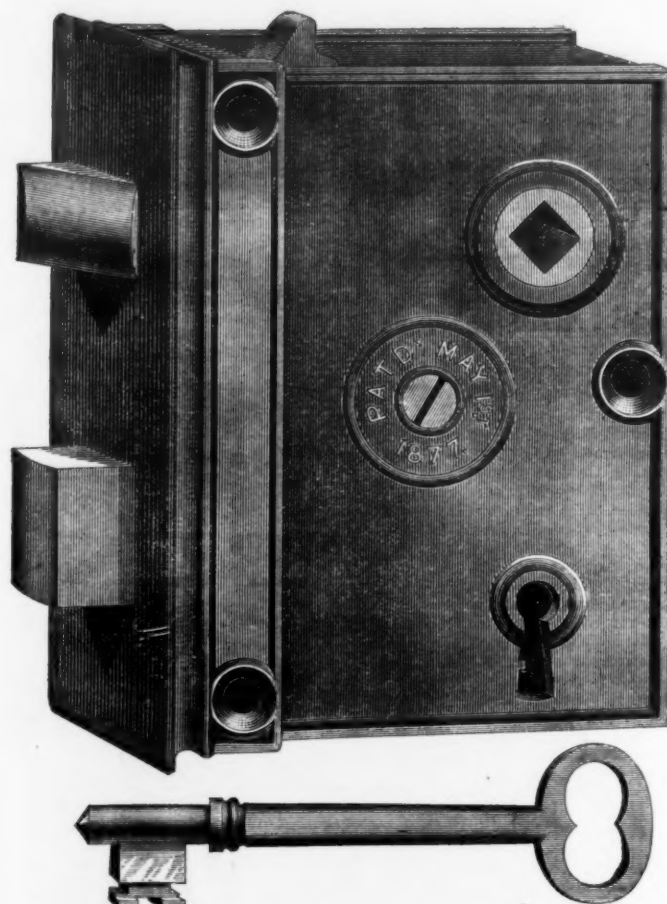
### BUILDERS' AND MISCELLANEOUS HARDWARE.

Factories, NEW BRITAIN, CONN., U. S. A.

Warehouse, NEW YORK, Nos. 87 CHAMBERS and 69 READE STREETS.

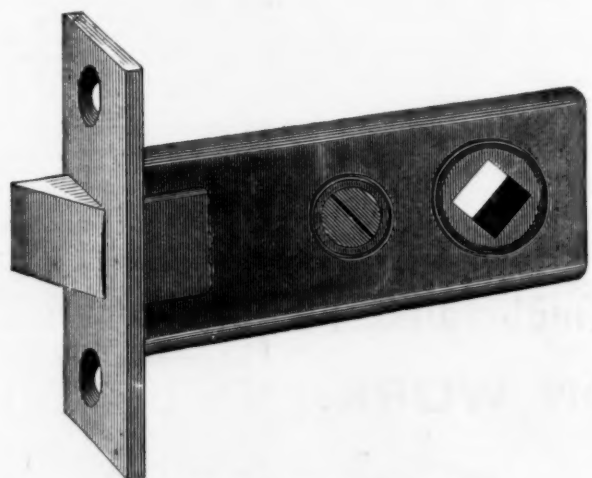


**Patent Reversible Mortise Knob Lock.**  
3½x3¼ inch, Nos. 1170 to 1185.

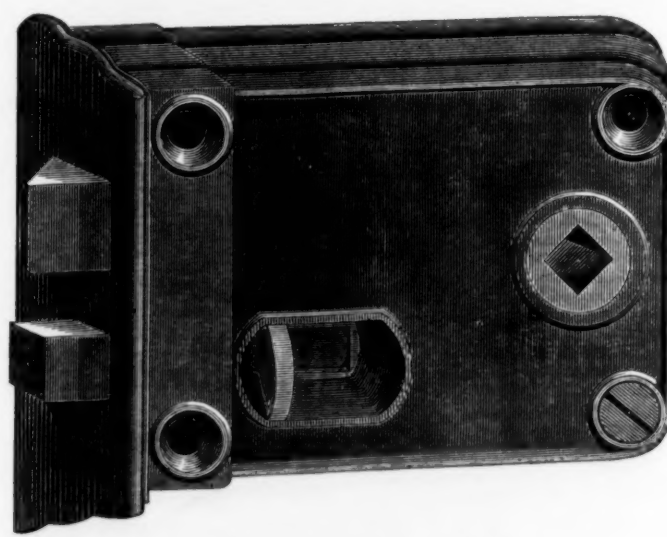


**Patent Reversible Rim Knob Lock.**  
4x3 inch, Nos. 462 and 463, with Stop.  
4x3 " Nos. 460½ and 465½, without Stop.

To change the hand, simply draw the Latch Bolt forward and turn it half round. The Hub TAKES its BEARING in BOTH PLATES, making the Lock as STRONG and SUBSTANTIAL every way as the old style handed Lock. We have introduced this style Reverse in 3 1-2 and 4 inch Mortise and 4 and 4 1-2 inch Rim.



**Mortise Knob Latch.**  
No. 0.



**Rim Knob Latch.**  
No. 302

### LOCKS WITH BRASS PLATED FRONTS AND BOLTS.

SIZE.—INCH.	DESCRIPTION.	PER DOZ.	SIZE.—INCH.	DESCRIPTION.	PER DOZ.
3½	<b>Mortise Knob Latches.</b>		3½	<b>Horizontal Rim Knob Latches.</b>	
3½	Same as No. 0, with Brass Plated Bolts; add to list of No. 0.....	\$0.50	3½	Same as No. 301½, with Brass Plated Bolt; add to list of No. 301½.....	\$0.50
	“ “ No. 0, “ “ “ “ Front, Strike and Bolt; add to list of No. 0..	1.25		“ “ No. 302, “ “ “ “ “ “ No. 302.....	0.75
	<b>Mortise Knob Locks.</b>			<b>Upright Rim Knob Locks.</b>	
3½ and 4	With Brass Plated Bolts, Plated Iron Key; add to list of same Locks, all Iron..	1.00	4	Same as No. 960½ or 460½, with Brass Plated Bolts, Plated Iron Key; add to list of same Locks.....	1.00
3½ and 4	“ “ “ “ Front, Strike and Bolts, Plated Iron Key; add to list of same Locks, all Iron.....	2.00	4½	Same as No. 1460 or 460½, with Brass Plated Bolts, Plated Iron Key; add to list of same Locks.....	1.00

When ordering Locks with Brass Plated Bolts, give the regular number, and add the letter b, thus: No. 0 b or No. 1170 b. When ordering same with Brass Plated Fronts and Bolts, repeat the letter, thus: No. 0 bb or No. 1170 bb. No other description needed.



[Continued from page 16.]  
INDUSTRIAL ITEMS.

The Louisville Chain Works, Messrs. Byrne & MacKenzie, will be ready for business within two weeks. They will run twenty-two fires and employ seventy hands. Their line of goods will include the manufacture of patent wrought iron swivels, trace, coil, ox, log, wagon, drill, reel, lift, rake and steamboat chains—all sizes, indeed, from a trace chain up to one inch. Capacity 700 to 800 pairs of trace chains per day, with proportional amount of coil and twist.

Fischer, Leaf & Co., stove and mantle founders, Louisville, are running full force, and have all the business they can do.

## TENNESSEE.

The Chattanooga Furnace is out of blast for repairs.

Bear Spring, Clark and La Grange furnaces are in blast and selling their iron very nearly as fast as made.

The Cumberland Furnace is in blast and increasing its stock slightly.

Brownport Furnace is cutting wood and getting ready for a small blast.

Dover Furnace is idle and for sale, with some prospect that it will be purchased by Pittsburgh parties and put in blast soon.

Rough and Ready Furnace is not likely to start till long after business revives. The same may be said of Wayne.

It is reported that Mr. A. B. Payne, of Nashville, is preparing to start Worley Furnace.

Mount Vernon Furnace will remain idle until there is something tangible in the revival of trade.

The Roane Iron Company's Rail Mill, Chattanooga, commenced re-rolling old rails for the Memphis and Charleston and the East Tennessee, Virginia and Georgia railroads the other day, to complete which will require, it is stated, three or four months.

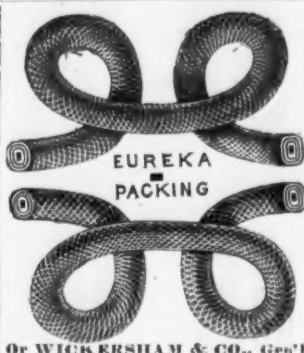
The convicts of Tennessee have been leased to the Sewanee coal mines for six years, for \$70,500 per annum.

## ALABAMA.

From a yield of 4000 tons in 1873, the product of Alabama's coal mines grew to 65,000 tons in 1876.

## KENTUCKY.

We clip the following notes from the *Greenup Independent*: "The sale of Boone Furnace property was confirmed on the 12th ult. by the United States District Court. The purchasers are D. M. Davis, of Pomeroy, O., and Jacob Ricker, of Cincinnati. In the Kentucky portion of the Hanging Rock iron region there are but five charcoal blast furnaces in operation this year, viz.: Bellefonte, Mt. Savage, Charlotte, Pennsylvania and Hunnewell. Pennsylvania Furnace is doing well. They are making 12 tons of iron daily. The furnace is well supplied with good ore. Charcoal is being received at the rate of from 12 to 14 loads per day. The Princess Furnace made a fresh start on the 18th of June. Twenty-five miners are employed to supply the furnace with coal. Ore is being received at the rate of 60 tons per day. Bellefonte Furnace, Boyd county, is making 12 tons No. 1 charcoal iron every 24 hours. This furnace went into blast the 3d of last May, and has made a very successful run up till the present time; 150 bushels charcoal and 3 tons raw ore are used to make 1 ton of metal; 15 loads charcoal are being received daily, and ore is being sent in briskly, for the digging and hauling of which from \$2.25 to \$2.75 are paid. Hunnewell Furnace blew in on the 22d of January, and made, till 1st of June, 2139 tons pig iron—124 days' run, which is a daily average of 17 1/2 tons—and the first 16 days in this month turned out 317 tons iron, being a daily average of 19 4/5 tons metal. She made in all, the first 140 days, 2456 tons good iron, being an average of 17 1/2 tons for the whole time. The manager, Col. S. Eifort, cut 18,860 cords wood the past winter, and has yet to cut, in order to clean up jobs, about 1000 cords; he is receiving 24 loads charcoal per day. The Latrobe, Keystone, Hamden and Cornelia (Lincoln) furnaces are all in for moderate blasts and doing unusually well. Low prices, long continued, bring a better grade of pig iron and larger yield. Care is given to quality of stock and work of furnace. The Buckeye Furnace will make a long blast, the depression of business not affecting her production. The Munroe Furnace still gives the best results as regards to yield, making some 18 tons daily. The Union Iron Company (the Washington and Munroe furnaces), Hamden and Buckeye furnaces have large stocks of ore, the former some 15,000 gross tons, while the other charcoal furnaces have small piles and desire only running stock. The Hamden Furnace, it is said, will arrange to try stonecoal next season if times do not change radically for the better. Her wood is scarce, ore abundant. The Latrobe Furnace probably will never blow again, being much out of repair and with little or no timber. She is rented this year to J. H. Cobb, and was put in operation at slight expense, not even a new hearth being added. The charcoal furnaces have a hard row to hoe, and but few in this county will be warm until pig iron is \$30 per ton at home. Of the stonecoal furnaces the Star and Fulton only are running. The Star made an exceptional start, making up to a daily yield of 12 to 13 tons No. 1 foundry metal the first fortnight, but has since fallen off and is now in mill iron. Is not receiving ore. The Fulton Furnace is not doing so well as could be desired, owing to poor material, and has very clearly demonstrated that cheap stock is dear. The Huron, Orange and Tropic are cold. Of the six furnaces in Jackson town but one, the Fulton, is getting ore. At the Wellston Furnace matters are *status quo*. The Eliza Furnace is in slow course of erection, and doubtless will not blow before late fall. The Wellston Company have concluded to remain idle, their expense having convinced them that by so doing they keep on the safe side—i. e., the profitable one. Have no stock, and probably will not receive any this year. The Milton Furnace is drying out her Whitwell oven, and will fill up and blow in within ten days. The blast will have preliminary heating in cast iron stove and go into the Whitwell with a temperature of 300 to 400 degrees. This is a new departure, but the results should be good. The com-



Or WICKERHAM & CO., Gen'l Agents, 403 Library St., Phila.

True Merit & Excellence is the Basis of all Success

## THE EUREKA

## STEAM AND HYDRAULIC PACKING.

The results of a long series of experiment made with a view of meeting all the requirements of a Perfect Packing. And we assert without any reservation that it is the best article of its kind yet invented. It is made of the best materials, is elastic, pliable, and does not become hard by use, consequently is easily taken out when renewal is necessary. It has a rubber center, rectangular in form, covered with a series of bristles of iron, between which is placed a lubricative compound superior to anything ever before used for the purpose, and contains nothing that can in any manner cut, flake or ruin the rods, no matter how long run. It has thus far received the highest praise of every engineer who has used it, and we have received many testimonials from the proprietors of Mills, Factories, Iron Works, etc., that it is the most durable, efficient and cheapest Packing they ever used. All we ask is a fair trial, knowing it will convince better than any words of ours. Orders promptly filled.

SYMONDS & CO., 120 Exchange Place, Phila., Sole Manufacturers.

## REFRIGERATOR MANUFACTORY OF William Law,

709 & 711 Third Avenue, N. Y.

## PRICE LIST.

	Chest.	Upright.
No. 1.....	each, \$ 5.00	\$11.50
No. 2.....	" 6.50	14.00
No. 3.....	" 8.00	16.50
No. 4.....	" 9.50	18.50
No. 5.....	" 11.50	24.50
No. 6.....	" 13.50	29.50
No. 7.....	" 15.50	35.50

Discount to the trade. Illustrated catalogues sent on application. All kinds of Refrigerators made to order.

## N. &amp; G. TAYLOR CO.'S

EXHIBIT IN THE

## Philadelphia Permanent Exposition.

We have made some extensive improvements on our exhibit in the Main Building of the late Centennial Exhibition, to such an extent that it now embraces many new and interesting features; all of which combined cannot fail but be of special service to those interested in Tin Plate and its workings. Nearly all of the articles on exhibit have been made with great care and are intended especially for our display. We have had them all attractively arranged in their proper order and position, carefully catalogued, thus making virtually the first and only, strictly complete exhibit of its kind ever presented to the public. We cordially invite all to visit it and give it a careful examination, and for further information, shall be pleased to see them at our office and stores, Branch Street, Philadelphia.

Our display embraces exhibits of the HENDY Prize Brand Tin Plate; Patent Patterns, such as Circles, Squares, Ovals, Oblongs, Octagons, Splayed, &c., showing the economy in the manufacture of Tin Plate and the saving of clippings to consumers; samples of the working of our own size 28x20 Roofing Tin; patented continuous Roofing Tin; our own special Boiler Sizes; Spouting Tin, &c.; Tanners' and Roofers' Tools and Machines of every description; Burritt's Double Sealers, showing their admirable uses; our stone-coal Tube Furnaces, for heating of soldering irons; samples of the celebrated HENDY Solder, very fine; Wire; Rivets; Roofing Nails; Black and Galvanized Sheet Iron. In addition to this our display of Minerals, Ores, &c., will be quite large and embrace most of the prominent Metals, both in their crude and finished state, such as samples of our HENDY Iron, carefully classified, showing the whole process of making this celebrated brand, from the rude ore to the polished sheet. We also have on exhibit: Pig Tin; Banca, Billiton, Straits, English, Australian, Refined; Lead; Spanish, English, Domestic; Sott and Hard Pig Brass; Antimony; Bismuth; Borax; Babbitt, Type and Yellow Metals; Copper; Lake Superior and Australian, &c., &c.

## N. &amp; G. TAYLOR CO.,

Manufacturers and Direct Importers of

## TIN PLATE. PHILADELPHIA.

Established..... 1810.

Sixty-seventh Year.

## The Patent Automatic Stokers

which were shown by Dillwyn Smith at the Centennial Exhibition in the British section, and obtained the medal and highest award, are now offered to the users of steam in the United States, by the "United States Automatic Stoker Co." under a license from Dillwyn Smith, for use on land boilers, with full confidence that the satisfactory results obtained in Great Britain and on the Continent of Europe (where over 1200 of them are in use), will be fully realized here. Some of these results are: The generation of from 25 per cent. and upward of steam from a given grate surface above what is obtained from the same quality of fuel fed by hand. The lessening of the cost of steam from 10 to 30 per cent. from being able with the Stokers to properly burn a lower priced fuel. The entire removal of the smoke nuisance. The lessening of the labor of the fireman. Their use also materially reduces the temperature of the fire room and also prevents the injury to the boiler caused by the contraction and expansion of the plates resulting from the frequent opening of the fire doors in hand firing. These and other advantages have secured their introduction into the boilers of many of the largest Mills and Iron Works in England and other countries, and we are now turning out an average of 10 machines per week. A few letters are given from some of those having them in use, the statements in which can be implicitly relied upon. For information respecting price, &c., apply to

## THE UNITED STATES AUTOMATIC STOKER CO.,

DILLWYN SMITH, President, 2 Chestnut St., Philadelphia.

## LAND MACHINES.

From A. M. Collins, Son & Co.'s Factory, Third and Canal Streets, Philadelphia.

DILLWYN SMITH, Esq.—Dear Sir: After several months' experience with your Automatic stokers, we take pleasure in stating that they have proved entirely satisfactory to us. The saving in cost of fuel we estimate at 20 per cent., increased amount of steam fully 50 per cent., beside giving us a very regular supply, the variation not being appreciable on steam gauge. Hoping you may be successful in introducing them into general use in this country, we remain, Yours, truly,

A. M. COLLINS, SON & CO. Wigan Coal and Iron Company.

Wigan, September 26, 1873.

Dear Sirs: I have pleasure in certifying that the

Stokers applied to our boilers at Kirkless have worked to our satisfaction, and have effected a saving in fuel. Be good enough to put in hand a x m for the range of boilers at our Alexandria Pit.

I remain, yours, truly, W. H. HEWLETT.

From J. R. Jones, Esq., Afonwen Piper Mills, Holywell.

The Earl of Dudley's Round Oak Works, Birmingham, 6th March, 1876.

I have much pleasure in stating that the Stokers you have fixed at these Works are giving most satisfactory results. The first you put down convinced me that we

could use it for burning the fine screenings or dust from the slack; and those you have since erected have fully confirmed me in that opinion, for not only do we now use the screenings we could not previously burn at all, but the generation of steam is so rapid that we have discontinued using one of the boilers, finding we can obtain, by the aid of your Machine, quite as much steam from three boilers as we previously could from the four.

Yours, truly, R. SMITH CALSON.

Hurst Mills, Ashton-under-Lyne, 26th September, 1873.

Dear Sirs: We have had your Patent Mechanical Stokers in our use for some time, and find they work to our entire satisfaction, and effect a considerable saving in coal.

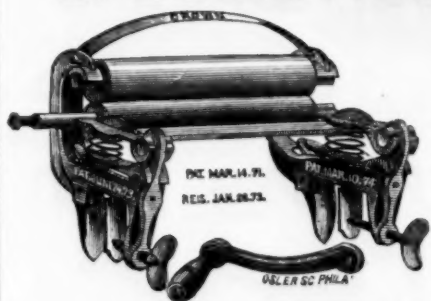
Yours, respectfully, CLDHAM WHITTAKER & SONS, Per W. TROOP.

Note.—They have ten double Machines at Work.

## THE AMERICAN MACHINE COMPANY, Philadelphia, Pa.,

MANUFACTURERS OF

## SPECIALTIES OF LIGHT IRON WORK.



CROWN WRINGERS,

with Patent White Rubber Rolls, Galvanized Malleable Iron Frame Work, Bessemer Steel Springs, &c. Noted for Strength, Durability, Efficiency and Simplicity.

No. 2, Rolls 1 1/2 in. diam., 10 in. long. No. 2 1/2, Rolls 1 1/2 in. diam., 12 in. long. No. 3, Rolls 1 1/2 in. diam., 12 in. long. No. 4, Rolls 2 in. diam., 12 in. long.



CROWN FLUTING MACHINES,

with valuable improvements over other style Machines. Patent Spring Arrangement and Clamping Device. Noted for Superiority of Finish and Practical Advantage. The leading Machine in the market.

Sizes (length of Rolls), 4 1/2 inch, 6 inch and 8 inch. Rolls with 10, 12, 15, 18, 22, 26 and 30 flutes.



## A PORTABLE



For Every Family. Approved and recommended. Centennial Medal and Diploma. Send for illustrated circular to L. Falk, 165th Street, New York City.

For sale by the Hardware and House Furnishing Stores.

pany have a large stock of ore, 7500 tons, and are receiving 40 to 50 tons daily. Limestone ore, \$3 per ton; block, \$2.50—all paid in goods.

W. C. Kelly, ax manufacturer, Louisville, is running full time and employs twenty-five men.

A new co-operative foundry has been undertaken at Louisville, known as the "Excelsior," Messrs. Scanlon, Drew & Co., proprietors. They will start up next week with twenty hands, and be prepared to turn out the most approved make in stoves, hollowware, mantles, grates, sash weights, etc.

The Nelson (Bullitt county) Furnace was sold at public sale last month, the Bank of Louisville becoming the purchaser at \$10,000. The same party purchased the Belmont Furnace for \$11,300.

The rail mill at Swift's (Covington) Iron and Steel Works was put in motion Monday, giving employment to about 200 additional mechanics.

## MISSOURI.

Thomas Green, slag smelter at Granby, in ten minutes less than eight hours, on a run of slag, produced 9000 lbs. of lead, or 110 pigs, which comes well up to the brag runs at Hopewell and Old Mines.

We quote the following from *Mines, Metals and Arts*. Our reports as to iron furnaces are a little different: "The furnace interests of Missouri are no worse off than similar interests in other states. Still, candor requires the statement that things are down to a low pass. The great decline in the value of charcoal irons has robbed Missouri of a trade in which she was nearly pre-eminent for many years. Large stocks of high priced charcoal pig are still held, and manufacturing cost is not now expected for it, even if sold in the smallest lots. Our lead furnaces became a host within the past ten years; nearly 65 lead furnaces are running in this State, but with a market upon which the best of lead falls, and can scarcely realize 5.14c. per pound, it is not to be supposed the smelters will pay a high price for ores. The Ironstone Blast Furnace is blown out; the Iron Mountain will shortly follow. South St. Louis has done nothing for a long time. One Missouri, and the three Vulcans are alone running in St. Louis. A slight change is making in the Jupiter beneath the bell, not that this circumstance has any positive promise of an early blow-in. The Missouri zinc furnaces are running; so are the Martindale. The Carondelet is idle, and zinc low. Zinc ore of the best qualities only are admissible. The fact of an increase in the production of pig iron in Missouri from 59,717 tons in 1875 to 68,223 tons in 1876, finds probable explanation in the large consumption of Vulcan pig for use in its own converters. But six out of nineteen furnaces of 1875 are in blast in 1877, of which four are stonecoal furnaces."

The Groom Shovel Company, of St. Louis, write us that, having been shut down for three weeks to put in larger engine and double their number of hammers, their capacity is largely increased, and hereafter they will be able to fill their orders with greater promptness. They have much improved the standard of their goods, and added the item of solid steel shovels and spades.

## GEORGIA.

The Pool and Rogers furnaces are for sale or to rent.

The Bear Mountain furnaces are abandoned.

## American Tools in Berlin.

Collector Tutton, of Philadelphia, has received the following letter:

UNITED STATES CONSULATE GENERAL, BERLIN, June 12, 1877.  
Hon. Assistant Secretary of State, Washington, D. C.—SIR: I have the honor to acknowledge the receipt of instructions Nos. 108 and 109, the latter having reference to the disposition made of my No. 249 in relation to the International Exhibition in this city.

In this connection I will not omit to make mention of the decided interest caused here by collections of locks and tools of American manufacture now on exhibition in this city, through the agency and in the buildings of the Berlin Association of Architects. As regards the former, it is conceded on all sides that no locks are made anywhere in this country that can compare with those exhibited, either in quality and workmanship or in cheapness, and with proper effort to introduce them they cannot fail to find an exclusive and profitable market in Germany.

Of the sets of tools exhibited, all of which are found most handy and perfectly finished, it is especially the axes and hatchets, so smoothly polished and varnished, with their suitable and practicable handles, and also the planes and augers, with their ingenious improvements, that met with favor and admiration. To find for the creditable specimens of American industry a market abroad is a subject well deserving the attention of our enterprising business men. A collection of articles of American furniture, from their excellent material as well as their substantial workmanship, is likewise exhibited, and receives much commendation. As there would seem to be no good reason why a market should not be found in this country, by reason of their superior merits, for these and other articles of our manufactures, I trust that it will not be deemed out of place if I have ventured briefly to bring the subject to your attention. I am, sir, your obedient servant,

H. KREISMAN, Consul General.

A Salt Lake correspondent of the *Chicago Inter-Ocean* says: "Last year we imported from the East 7500 tons of Pittsburgh coke; cost laid down here about \$30 per ton on the average. One of our largest smelters has ordered 1000 tons of English coke, soon to arrive in San Francisco in sailing ships, that will only cost \$21 per ton laid down at the furnace." The reason of this order is that the Union and Central Pacific roads charge such high freights from Pittsburgh that it is impossible to compete with ocean freights. The time will come when this question of freight will have to be regulated in a somewhat different manner than by allowing the whims or caprices of some general freight agent to control.

## RHODE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I.

WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS of

HORSE AND MULE SHOES.



# READING HARDWARE COMPANY, Reading, Pa.

Fac-simile of the Centennial Medal awarded by the United States Commission at the Exhibition held at Philadelphia, 1876, to the READING HARDWARE COMPANY, of Reading, Penn.,



For their READING PATENT IMPROVED APPLE PARER, being the only Medal awarded to exhibitors of Apple Parers at the Exhibition, showing its superiority over all others on competition.

## '77 UPRIGHT PATENT READING APPLE PARER.

Most Complete Apple Paring Machine Ever Offered to the Public. With all the Latest Improvements.

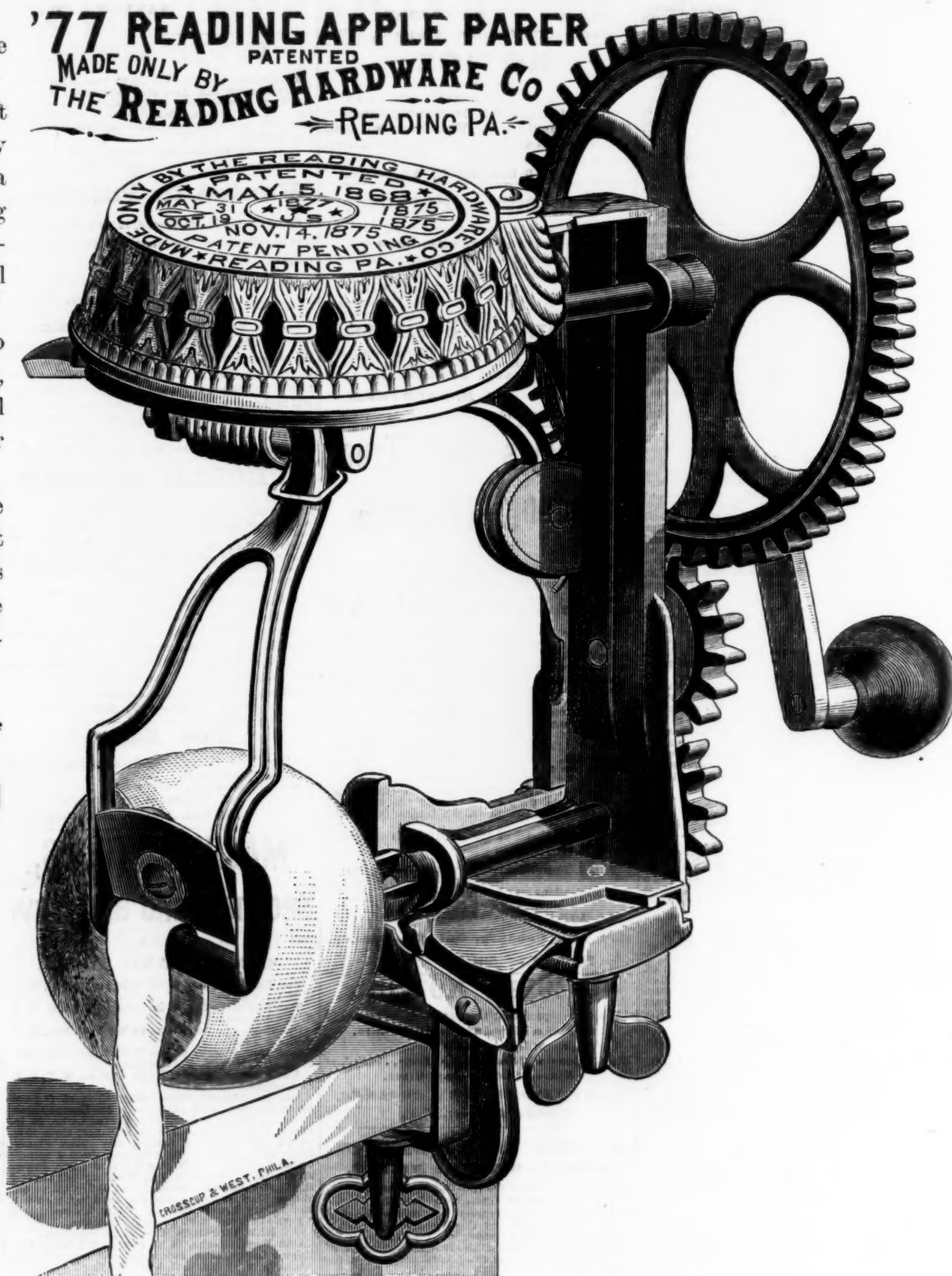
Among its advantages are the following:

1st. No parings are left on the base of the apple by this machine, the extra knife on the arm removing all remaining after the operation of the principal knife.

2d. It can be secured to any part of the table—front, side or corner—and will still throw the paring clear of the machinery.

3d. The clamps are made heavier, and by the upright position of the machine it is secured more firmly to the table and has more steadiness in operation.

**'77 READING APPLE PARER**  
PATENTED  
MADE ONLY BY  
**THE READING HARDWARE CO.**  
READING PA.



4th. The movement being uniform, it takes off a thinner paring, while the direct action of the push-off lever removes the pared fruit without handling.

5th. The shafts, being square, cannot turn in the wheels of the machine.

6th. Each machine is packed separately in a paper box, rendering it less liable to injury in transportation and better adapted to the wants of the trade.

**Reading Hardware Company,**

READING, PA.,

MANUFACTURERS OF:

**DOOR LOCKS**

AND

**Lock Furniture,**

**BUTT HINGES,**

Axle and Frame Pulleys, Coat and Hat Hooks,

**THIMBLE SKEINS & PIPE BOXES,**

Together with a Full Line of

Japanned, Brass American,

Dark Bronzed

AND

**Genuine Bronze Metal**

**HARDWARE**

in all the newest designs and

in great variety.

As but a limited quantity of parers will be made the present season, orders should be sent early to be promptly filled. For terms and prices of Parers and other Hardware address

**READING HARDWARE COMPANY, Reading, Pa.**



## Special Notices.

## FOR SALE.

## Bargains Extraordinary.

New and second hand machinery for sale, as follows—the new machines being marked N, all others being second hand.

## Machine Tools.

PLANERS.—22 ft. x 45 in. square, \$900; 16 ft. x 45 in. square, \$750; 10 ft. x 45 in. square, \$500; 8 ft. x 45 in. square, \$400; 6 ft. x 45 in. square, \$300; 4 ft. x 45 in. square, \$200; 3 ft. x 45 in. square, \$150; 2 ft. x 45 in. square, \$100; 1 ft. x 45 in. square, \$50; 1 ft. x 30 in. square, \$30; 1 ft. x 24 in. square, \$20; 1 ft. x 18 in. square, \$10; 1 ft. x 12 in. square, \$5; 1 ft. x 6 in. square, \$2; 1 ft. x 3 in. square, \$1; 1 ft. x 1 1/2 in. square, \$1/2; 1 ft. x 3/4 in. square, \$1/4; 1 ft. x 1/2 in. square, \$1/8; 1 ft. x 3/8 in. square, \$1/16; 1 ft. x 1/4 in. square, \$1/32; 1 ft. x 1/8 in. square, \$1/64; 1 ft. x 1/16 in. square, \$1/128; 1 ft. x 1/32 in. square, \$1/256; 1 ft. x 1/64 in. square, \$1/512; 1 ft. x 1/128 in. square, \$1/1024; 1 ft. x 1/256 in. square, \$1/2048; 1 ft. x 1/512 in. square, \$1/4096; 1 ft. x 1/1024 in. square, \$1/8192; 1 ft. x 1/2048 in. square, \$1/16384; 1 ft. x 1/4096 in. square, \$1/32768; 1 ft. x 1/8192 in. square, \$1/65536; 1 ft. x 1/16384 in. square, \$1/131072; 1 ft. x 1/32768 in. square, \$1/262144; 1 ft. x 1/65536 in. square, \$1/524288; 1 ft. x 1/131072 in. square, \$1/1048576; 1 ft. x 1/262144 in. square, \$1/2097152; 1 ft. x 1/524288 in. square, \$1/4194304; 1 ft. x 1/1048576 in. square, \$1/8388608; 1 ft. x 1/2097152 in. square, \$1/16777216; 1 ft. x 1/4194304 in. square, \$1/33554432; 1 ft. x 1/8388608 in. square, \$1/67108864; 1 ft. x 1/16777216 in. square, \$1/134217728; 1 ft. x 1/33554432 in. square, \$1/268435456; 1 ft. x 1/67108864 in. square, \$1/536870912; 1 ft. x 1/134217728 in. square, \$1/1073741824; 1 ft. x 1/268435456 in. square, \$1/2147483648; 1 ft. x 1/536870912 in. square, \$1/4294967296; 1 ft. x 1/1073741824 in. square, \$1/8589934592; 1 ft. x 1/2147483648 in. square, \$1/17179869184; 1 ft. x 1/4294967296 in. square, \$1/34359738368; 1 ft. x 1/8589934592 in. square, \$1/68719476736; 1 ft. x 1/17179869184 in. square, \$1/137438953472; 1 ft. x 1/34359738368 in. square, \$1/274877906944; 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## ST. LOUIS.

Specially reported by Messrs. SPOONER & COLLINS, Iron commission merchants, 217 North Third street, St. Louis, under date of July 5: Market very dull, and hardly anything doing. Nearly all of our mills and foundries are closed for two or three weeks. Prices unchanged:

	No. 1.	No. 2.	White and Mill.	Mo. & Id.
Missouri Stone Coal.....	\$23.00	\$22.00	\$21.50	\$20.00
Missouri Charcoal.....	23.00	22.00	23.00	20.00
Tennessee Charcoal.....	23.00	22.00	23.00	20.00
Southern Coke, very soft and strong.....	25.00	23.00	22.00	22.00
Hanging Rock Charcoal.....	26.00	24.50	23.50	22.00
H. R. Charcoal, Cold-short.....	25.00	24.00	23.00	22.00
Extra B.....	25.00	24.00	23.00	22.00
Alice H. R. Coke.....	25.00	24.00	23.50	23.00
Quinnmount, West Virginia, Coke.....	25.00	24.00	23.50	23.00

## COLD-BLAST CHARCOAL—All Numbers.

Hanging Rock.....	\$25.00	\$24.00	4 mos.
Tennessee.....	28.00	26.00	4 mos.
Kentucky.....	28.00	26.00	4 mos.
Missouri.....	28.00	26.00	4 mos.
Georgia.....	28.00	26.00	4 mos.
Alabama.....	28.00	26.00	4 mos.
Assorted Bar Iron.....	28.00	26.00	4 mos.
No. 1 Railroad.....	1.00	1.00	4 mos.
Machinery Cast.....	.80	.80	4 mos.
Light Cast.....	.55	.55	4 mos.
Old Rails.....	18.00	19.50	4 mos.
Old Car Wheels.....	18.00	19.00	4 mos.

## CINCINNATI.

Messrs. L. R. HULL & Co., under date of July 7, write us as follows: We are able to note a somewhat improved demand for Foundry Irons, and large lots have been placed since last report. The inquiry for some grades of Mill Iron is better, but the demand is generally slack for Forge Irons. Prices remain unchanged:

## HOT-BLAST FOUNDRY.

Hanging Rock No. 1, Charcoal.....	\$24.00	\$24.00	4 mos.
Hanging Rock No. 2, Charcoal.....	22.00	22.00	4 mos.
No. 1 Coke.....	23.00	23.00	4 mos.
No. 2 Coke.....	22.00	22.00	4 mos.
No. 1, Stone.....	21.00	22.00	4 mos.
Virginia, No. 1 Coke.....	24.00	24.00	4 mos.
No. 2 Coke.....	23.00	23.00	4 mos.
Ala. and Tenn., No. 1 Charcoal.....	20.00	21.00	4 mos.
No. 2.....	21.00	22.00	4 mos.
Red-short, No. 1 Coke.....	21.00	22.00	4 mos.
Fannie U. S. Scotch No. 1.....	23.00	23.00	4 mos.
Alice.....	21.00	22.00	4 mos.
Am. Scotch No. 1.....	21.00	22.00	4 mos.

## FORGE IRONS.

Hanging Rock No. 1, Charcoal.....	\$21.00	\$21.00	4 mos.
Hanging Rock No. 2, Charcoal.....	21.00	21.00	4 mos.
Virginia, No. 1.....	20.00	21.00	4 mos.
Ala. and Tenn., No. 1 Charcoal.....	20.00	21.00	4 mos.
Red-short, No. 1 Coke.....	22.00	22.00	4 mos.
Cold-short, No. 1 Stonecoal.....	19.00	20.00	4 mos.

## CAR WHEEL AND MALLEABLE.

Hanging Rock.....	\$24.00	\$24.00	4 mos.
Southern and Western Brands.....	30.00	35.00	4 mos.

## ORE.

Lake Superior.....	8.50	8.50	cash.
Virginia Hematite (Washed).....	4.25	4.25	cash.

## CHATTANOOGA.

Specially reported by S. B. Lowe, dealer in Metals, under date of July 9: Notwithstanding a concession in prices there has been considerable activity in metal during the past week. The foundry grades are moving freely, and no trouble is experienced in making sales. Business appears to be quite brisk with most of the Southern foundries, and a feeling of improvement in business prevails.

## COKE.

No. 1 Foundry, extra.....	\$20.00	\$21.00
No. 1 Foundry.....	19.00	20.00
No. 2 Foundry.....	17.00	18.00
Gray Forge.....	15.00	16.00
White and Mottled.....	14.00	15.00

## HOT-BLAST CHARCOAL.

No. 1 Foundry, extra.....	\$21.50	\$22.50
No. 1 Foundry.....	19.00	20.00
No. 2 Foundry.....	17.00	18.00
Gray Forge.....	15.00	16.00
White and Mottled.....	14.00	15.00

## COLD-BLAST CHARCOAL.

Car Wheel Metal.....	\$22.50	\$27.50
extra standard.....	24.50	29.50
Forge Metal.....	17.50	20.50
Muck Bar.....	20.00	31.00
Old Car Wheels.....	15.00	16.00
Old Rails per ton.....	16.00	17.00
Brown Hematite Ore 50 to 56 per cent.....	1.75	2.25
Red Fossiliferous Ore, 50 to 56 per cent.....	1.50	1.75

## BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, 46 and 48 South Charles street, report us the following prices, under date of July 9: The week just closed was about the dulllest of the year, and a revival of anything like general activity is not to be anticipated until the coming of cooler weather. Values are depressed at unchanged figures:

American Refined Bar Iron.....	1.25 to 2c.
1 to 6 wide by 3/4 to 1 thick.....	1.25 to 2c.
1 to 4 1/2 wide by 1 1/4 to 2 thick.....	1.25 to 2c.
Round and Square, ordinary sizes from 3/4 to 1 inclusive.....	1.25 to 2c.
Hoop iron, 1 1/2 wide and upward.....	3 to 3 1/4c.
Band iron, from 1 1/4 to 4 in. wide.....	2 1/2 to 3c.
Horseshoe iron, 3 1/2 to 4 in. wide by 3/4 thick.....	3 1/2 to 4c.
Norway Nail Rods.....	3 1/2 to 4c.
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes.....	14 1/2 to 15c.
Machinery Steel.....	7 1/2 to 8c.
Cast Spring Steel.....	7 1/2 to 8c.
Homogeneous Steel Plate.....	8 1/2 to 9c.
Perkins' Horseshoes, per keg of 100 lbs.....	\$3.92 1/2
Muleshoes.....	4 1/2 to 5c.
R. R. Spikes.....	2 1/2 to 3c.
Common Horse Nails, from 14c. to 18c. per pound.....	14c. to 18c.
Putnam Horse Nails.....	23 to 26c.
Globe Horse Nails.....	23 to 26c.

Messrs. R. C. HOFFMAN & Co., Iron and commission merchants, No. 23 South Frederick street, report the Pig Iron market as follows, under date of July 9: The Iron market continues dull and depressed, with light sales. We quote:

Baltimore Charcoal.....	\$20.00	\$21.00
Virginia.....	28.00	31.00
Anthracite No. 1.....	19.00	20.00
No. 2.....	18.00	19.00
No. 3.....	17.00	18.00
White and Mottled.....	15.00	16.00

## RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, Richmond, Va., writes as follows under date of July 8: Since the change of hands in about 150 tons Charcoal Iron last week, nothing worthy of notice has occurred. Prices continue as previously quoted:

Va. Cold-blast Charcoal, Cold-short.....	\$21.00	\$25.00
Va. " " Neutral.....	30.00	32.00
Anthracite, No. 1.....	21.00	22.00
No. 2.....	20.00	21.00
No. 3.....	19.00	20.00
Coke, No. 1.....	25.00	26.00
No. 2.....	24.00	25.00
No. 3.....	23.00	24.00

## FOREIGN.

## FRANCE.

## (Moniteur des Interests Matériels).

PARIS, June 24, 1877.—Metals.—As we approach midsummer general business slackens, and this is particularly the case this year in view of the uncertainties surrounding both domestic and foreign politics. Many failures are announced, our own Paris, twenty-two in a single day of the present week, and bankers are withdrawing credits, not only in France, but in China and South America, so as to be as little engaged as possible. The Metal trade in common with other branches suffers more or less from this untoward state of affairs. Copper, nevertheless, remains firm; we quote ordinary brands of Chili Bars, 182.50 francs; current, 187.50; Ingots and Slabs, 192.50; English Best selected, 195 and Corcoran's, 197.50. Havre is steady as follows: First brands Chili Bars, 182.50 to 183.75; good current ditto, 180; Loti and Urmeneta, 176.25 to 177.50; all the 100 kilos. Farne conditions. Marseilles is well sustained; they quote Red Tokat, 175 to 180; small Refined Ingots, 180; Sheathing, 220; Bolts, 230, and Yellow Metal Shaving, 210. Tin.—This metal has been tolerably steady during the week in the French markets, and the same has been the case in England, where the Australian tin business seems to be getting better under control, although the output at the Antipodes is probably as large as ever. It has been stated that the Aluvial Tin Mines in Australia, were rapidly being exhausted, but, on the other hand, Tin Ore abounds over a great extent of country and promises well. We have been quiet here at the following quotations: Banca, deliverable at Havre or Paris, 192.50 francs the 100 kilos; Billiton, 187.50; Straits, 185; Australian, 184, and English at Havre or Rouen, 183. Tin is quiet at Marseilles, where they quote Banca, 195; Straits, 185, and English Refined, 192.50. Lead.—The general tendency remains a rather drooping one, with a further giving way of 5 p. per ton at London, and lower prices in this city too. We quote French Belgian and German at Paris, 52 francs the 100 kilos, and Spanish and English, 52. There is no change at Havre, where Soft is nominally quoted 53 to 53.50. Marseilles is quiet: First Fusion Soft, 49.50 to 50 francs; Second Fusion, 49 to 49.50; Sheet and Tubes, 54.50, and Shot, 54.50. Spelter.—The downward course of this metal has been uninterrupted, although at no time precipitate. This gradual depreciation, even during the most favorable business season, has had its small effect in engaging the attention of the metal trade, and in connection therewith we may mention that in the new mining districts of Sweden the output is described as being quite considerable and promising. It seems, indeed, as though in various quarters production had begun to exceed consumption very materially, which would explain this constant giving way we are witnessing. Business in the metal has been very much restricted here, and the demand is quite Silesian any higher than 51 to 52 francs the 100 kilos here and at Havre. Marseilles continues to decline; Sheet Zinc there 68 to 70 francs the 100 kilos, and Old Remelted, 46. Iron.—A good deal of irregularity is noticeable, owing to the difference in views on the part of holders, some being anxious sellers and others quite stiff. Thus at Paris the extreme range for Merchant Iron is between 187.50 and 195 francs, and Sheet and Sheet Iron are firm, however. In the Loire and Rhone districts Iron has been quite active, especially the species suitable for agricultural implements and for building purposes. In the Haute Marne activity prevails in replenishing assortments; Sheet Iron in a good position and Nail Rods have advanced 1 franc. Wire and Machinery are in request, but Chains are neglected. In the Meurthe-et-Moselle we hear most of the blast furnaces have engaged for the remainder of the year their entire output of Pig Iron at 64 to 65, at which the same closes firmly. Coal is weak and irregular now that we find ourselves in the midst of the dull season.

## BELGIUM.

## (Revue Universelle).

BRUSSELS, June 24, 1877.—Iron.—The Charcoal market has been without animation. There has been a good deal of change, but the prices have remained stationary. Certain special kinds of iron have been very much wanted of late; a large lot of corner supports for buildings is just now being treated for bar at a figure hardly remunerative. Belgium Pig Iron has not yet been favorably influenced by the firmness observable in the neighboring Grand Duchy of Luxembourg; the demand has, however, been picking up the past few days. The price of iron telegraph poles is wooden ones is also picking up. Luxembourg Pig Iron now sells at 6 francs, delivered, and Belgium at 5.75 to 5.25 francs. Most of our rolling mills have work on hand sufficient to keep them through the summer season. England is becoming a customer of ours of the utmost importance, having taken of all sorts of Belgian iron manufactures during the first four months of the current year no less than 17,676 tons. Particularly noteworthy is the fact that occurred during the week in the Liege district, but we may at least assert that much that the situation in general in Belgium seems to be more reassuring than it was a year ago. The demand is firm, steady, and this causes prices to be well sustained. At Charleroi stocks are decreasing rapidly.

## GERMANY.

## (Borrenhafe).

HAMBURG, June 23, 1877.—Metals.—At the much lower prices ruling consumption has gradually reduced stocks, and will to a moderate extent do so during midsummer, usually the dulllest season of the year. We shall then approach the autumn with the metal trade established on a sound basis, a much safer one indeed than if speculation had in any way interfered with the markets as it did early in the spring with Spelter. In the meantime it is to be hoped for that the political matters on the continent may not assume more disquieting proportions than they have at present. Copper has been steady on the whole, although not very active. At all events it is looked upon as pretty safe at prevailing rates both here and elsewhere. We are unaltered here, and so is Stettin. Berlin continues to quote good qualities English and Australian, 76 to 78 marks the 50 kilos, and Refined Mansfield, 77 1/2 to 78. Tin.—There is some inclination manifested to lend this metal better support, and we look forward to less fluctuation than has hitherto been the rule. Hamburg and Stettin have maintained previously quoted prices firmly. At Berlin Banca remains 77.50 to 77 marks the 50 kilos, and English Refined, 74.50 to 75. Lead has relaxed into a quiet, not to say weak, mood, and although not exactly lower the metal has become languid, and larger lots could not be run off without a material concession. We leave previous quotations unaltered. Spelter.—We can but report what we have mentioned previously, viz. that the first hand holds little stock, and that the only parties still well supplied are speculators. In the meantime production abroad has been in excess of current consumption carrying down prices by degrees, not only of spelter but of Sheet Zinc, and the German markets have followed, showing a material abatement from the rates ruling early in the year. Hamburg and Stettin are nominal, and Berlin remains 21 to 21.50 the 50 kilos for Silesian sorts.

## HOLLAND.

## (Koch &amp; Vleerboom).

ROTTERDAM, June 26, 1877.—Tin.—The market has remained quiet, and but few sales have been effected of Banca, to be delivered from the late sale at 22.50 guilders the 50 kilos, while from the impending July auction it has sold at 22.25, and at this latter figure there are more buyers. Billiton to arrive has been done at 21.25, and subsequently at 21.12 1/2; on the spot it was placed at the latest named price. Lead.—Of the Holzappel brand 25 tons changed hands at 23 1/2 guilders the 50 kilos.

## AUSTRALIA.

## (Mining News).

SYDNEY (New South Wales), April 14, 1877.—Tin.—Respecting the New England district, we beg to remark that the Stanhope and Copes Creek and Vegetable Creek alluvial washings are being exhausted, but against this there are hundreds of acres yet unexplored, which present all the indications favorable for equally good deposits as those already at work. These remarks only apply to alluvial deposits. When lode mining comes to the fore, which it eventually will, large discoveries are likely to be made. Many lodes are cropping up, and are large and well defined, containing quartz,

mica and great stones of Tin in a fine granitic formation, with trap rock adjoining cross-courses and counter intersections; in other words, all the necessary conditions for large deposits of ore, and also easily worked by adit levels, with water enough for dressing purposes, except stamping, which will require steam power. The Elsmore Mine, in particular, shows intersections of lodes, counters and cross-courses all full of Tin cropping up to surface.

## EAST INDIES.

## (Giffill, Wood &amp; Co.).

SINGAPORE, May 19, 1877.—Tin comes in slowly, the drought having affected the Malacca supply. The buying is almost entirely for America, and prices, which at one time touched \$22.50 per picul, have declined to \$22.25 with sellers, but no buyers. There have been shipped to the United States from the Straits settlements the far in 1877, 18,371 piculs, against 12,850 piculs during the corresponding period of last year, 22,594 in 1875, 14,112 in 1874, 12,763 in 1873, 21,788 in 1872, 15,570 in 1871 and 14,615 in 1870. Shipping.—The Isolina cleared for New York with 1775 piculs Tin; the steamer Antenor to New York via London 2021 piculs, and the Chocora for Boston with 1783. Tonnage.—We do not change our previous rates of 40 for dead weight; this latter class of freight is plentiful, and would, perhaps, stand a higher rate. Exchange closes weak at 4 1/2 per dollar, buyers' credits.

## CLARK, SPENCE &amp; CO.

POINT DE GALLE (Ceylon), May 25, 1877.—Plumbago.—There is hardly any business to report, owing to absence of demand. Lumps are quite neglected; quotation nominal, \$12 to \$14. Chips are bought at \$3 to \$3.10, according to boldness and quality. Dust we quote at \$4.10 to \$5. Coal.—500 tons Cardiff, ex Stanley Colliery and a cargo of 2500 tons Cardiff, ex Stanley Colliery, 18 rupees per ton, ex ship. Stocks in private hands are moderate, and above prices likely to be maintained.

## Our Letter.

## Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, Eng., June 25, 1877.

## THE LONGEST DAY

has come and gone, and still we are not happy! Our friends, the Turks and Russians, don't get on with their little business as rapidly as they ought to do, although there are now indications that the Rubicon—that is to say, the Danube—will be crossed almost immediately, a proceeding which will probably determine the subsequent course of the warfare. At home we are dissatisfied and depressed in a commercial sense, and we cannot see any loophole for escape within any reasonable period. Politically we are pretty well satisfied with the conduct of the government, especially such of its acts as have had any bearing on the Eastern question or the preservation of an inviolable road to our vast Indian Empire. Domestically our lives are but little different from what their respective ebbing and flowing may be in the most prosperous times. We still live, at all events, and, although to some of us the fluctuations of the four or five barometer may be fraught with most vital interest, still we live and move, and have our being in England. Things are not very bright or hopeful just now with many a poor family, but we have faith that when "Barnaby Rudge," the longest day and shortest night, shall again come round we may be in better positions.

## ENGLISH TROOPS.

it is stated, are being held in readiness—to the number of 15,000 men—to proceed to Egypt the moment that step seems to be rendered necessary by "British interests," which will be, I presume, as soon as the Russians get near to Constantinople. The command of this force will be given to Lieutenant General Sir Thomas Steele, and the regiments employed will be the 8th, 10th and 21st Hussars (cavalry); the 42d, 71st and 74th Highlanders; 101st Bengal Fusiliers; 2d battalion of Grenadier Guards; 2d battalion Coldstream Guards; 1st battalion Scots' Fusiliers, and other troops of the line not yet stated, beside 5000 native Moslem troops from India. The camp has already been marked out in Egypt. Parliament, it is said, is to be asked for a special credit of about £10,000,000 to provide the expenses of this expedition.

## GENERAL GRANT

continues to be feasted and toasted, and is said to be "engaged" for the whole of June, July, and part of August. His letter to Mr. Childs, of Philadelphia, and his public speeches seem to show that the General is well satisfied with his reception, which is, as he plainly sees, not a personal matter, but a "hand-shaking" through him with our brethren in the States. The General is to be invited to come to Sheffield, if he can manage to do so. At the time of writing, it is uncertain whether or not he will accept the invitation addressed to him by the Town Council, but should he do so, he will find something to look at (particularly smoke, if it be wet weather), even in these dull industrial times.

## THE "SHAW" KNIFE CASE.

at Sheffield, in which (as I have previously detailed) a cutter named Helliwell sued George Wostenholm & Son (Limited) for full pay in lieu of work being found for him, was decided on Thursday last in favor of the plaintiff. The Sheffield County Court judge held that defendant's manager could not fix the price as he thought fit at 9 6 or any other rate, but should have had the knives made and then got the price arranged. Judgment was, therefore, for the full amount claimed.

## THE ROYAL AGRICULTURAL SHOW

will be opened at Newsham Park, Liverpool, July 11th, and will this year be larger than ever. There are 750 entries of machinery alone, and a prize list of about £7000. For two months 500 men have been at work putting up about six miles of shedding on the 75 acres of land devoted to the show. There are 400 horse boxes, each to foot square; 126 prizes for horses, 160 for cattle, 130 for sheep, 24 for pigs, beside £300 in prizes for the best cultivated farms in Lancashire, Cheshire, North Wales and the Isle of Man. Gold medals for the best cheese and the best three sides of bacon, open to the whole world, are this year's special features of the show.

## WAGES DISPUTES

are, in some districts, beginning to be tiresome, although they do not cause much actual loss to the employers. The Clyde shipwrights, as a body, are still on strike, as also are about 30,000 coal miners in various parts of Lancashire. In South Wales a partial

strike of colliers is expected, owing to the action of the trustees of the Plymouth and Aberdare collieries breaking through the sliding scale arrangement by giving their men notice of a drop of 10 per cent. In the North of England iron trade the employers are said to be desirous of so "rearranging" wages as to lower the puddlers five per cent, and other classes of iron workers fifteen per cent.

THE DARLSTON STEEL AND IRON COMPANY has at last arranged its affairs under the supreme direction of the Master of the Rolls, whereby its future designation will be the "Darlston Coal and Iron Company, Limited," with a capital of £150,000 in 15,000 shares of £10 each. The shareholders, creditors and debenture holders all agree to this.

## THE WEEK'S FAILURES

have not largely effected the iron trade, the only stoppage in any way connected therewith having been that of Mr. Joseph Angus, Sr., of Sheffield, who filed a petition Saturday, with debts reaching £50,000. The creditors of Mr. Aaron Marks, merchant, Sheffield, met last week and passed the statutory confirmation of their resolution accepting 11 in the £, at Bradford. Mr. William Morgan, theatrical lessee has "stopped," owing £7700. At the same time the creditors of Charles Beauland, stuff manufacturer have met, their debts amounting to £12,000, and at the same time the liabilities of S. Upton & Co. (Cleckheaton) were stated to be £10,000. At Halifax, Messrs. Battinson, manufacturers, have suspended, owing £20,000.

## SEVERAL EXPLOSIONS

have "been around" during the past week, and some of them have had rather ugly consequences. In the Tunnel Pit, Aberdare, Wales, an explosion of fire-damp killed one man and injured two others. At Hull a boiler exploded with such force as to kill a woman and injure a man, beside demolishing an adjoining house. At South Shields a boiler explosion killed a child which was being nursed on her father's knee (the father being unhurt), and a boy outside the premises, beside terribly injuring four other persons. By an explosion of salt in the combustion chamber of the port boiler of the steamer Palestine while at sea, voyaging from Boston, U. S., to Liverpool, one fireman was killed and two others terribly injured.

## THE IRON AND STEEL INSTITUTE

is at present without a paid secretary, the duties of that office having been assumed, temporarily, by Mr. Edward Williams, a member of the council. It is understood, however, that the post will shortly be filled up from the list of candidates already on hand.

## THE GREAT ALEXANDER

MacDonald has been "speaking his piece" once more. This was at Longton, Staffordshire, where he told a meeting of miners that the reason there were so many men idle and so many employers demanding an increase of working hours was because the men were "fools enough" to work too much, and did not "copy the example of those who manipulated these things." He held that the workman had as good a right to consider the question of limiting production as employers had, and they were great fools if they did not exercise that right. If there were less work there would be fewer strikes, and the condition of the workmen would be less hard. Oh, wise Alexander!—M. P.

## THE SCOTCH PIG IRON MARKET

has been quiet on the whole, albeit the week's shipments show to somewhat better comparative advantage. Stocks have increased by 200 tons, and there are now no fewer than 140,067 tons in Messrs. Connal's warehouses—a state of things which appears to render any considerable advance in prices an utter impossibility. The make is being reduced by blowing out furnaces, there being now only 106 at work, as against 116 at the same date last year. There are 12 blowing at Gartsherrie, 9 (of 12) at Coltness, 6 (of 9) at Glengarnock, and 12 (of 21) producing Eglinton brands.

Writing from Glasgow June 22d (evening), James Watson & Co. said: "During the past week the market has improved, business being done on warrants from 53 11 to 54 4 1/2 per ton, cash, and 54 6 one month open, closing buyers at 54 5, cash, sellers, 54 6 per ton. Shipments last week were 10,738 tons, against 7625 tons in the corresponding week of 1876." We quote:

	No. 1.	No. 3.
J. M. B., at Glasgow.....	55 6	52 1/2
Gartsherrie, ".....	52 6	55 1/2
Coltness, ".....	55 6	55 1/2
Summerlee, ".....	56 1/2	54 6
Langloan, ".....	52 6	55 1/2
Cambridge, ".....	57 1/2	53 6
Colliery at Port Dundas.....	5 1/2	53 6
Glenzarnock, at Ardrossan.....	59 6	54 6
Gilnorton, ".....	55 6	54 6
Dalmellington, ".....	55 6	53 6
Shotts, at Leith.....	56 6	55 1/2
Kinnell at Boness.....	56 6	55 1/2



license for the use of steam or other mechanical power for moving carriages on any tramway in Great Britain, with the exception of the London area, which is under the control of the Metropolitan Board of Works. This solves a question which has hitherto proved a vexed one—particularly in the larger provincial towns.

#### STAFFORDSHIRE AND BIRMINGHAM.

The quarterly meetings are again drawing near, but up to the time of writing no positive movement has been made which might lead to the inference that prices are to be lowered. At the same time all quotations are so weak and are being undersold to such an alarming extent that it is quite within the bounds of possibility that some of the best marked iron may be declared down to the extent of 10/ or even 15/ per ton. At present branded bars are all nominally maintained at £9 per ton, with the traditional 12/6 extra for Lord Dudley's bars and other finished iron in proportion. None of the Staffordshire iron works, however, are anything like half engaged, particularly in the Darlaston and Bilston districts, where thousands of workmen are unemployed and large collections of valuable plant totally idle. Sheets are, perhaps, selling better than any other kind of merchant iron; some of them for the use of the hardware producers, and some in a galvanized state for export to Australia, New Zealand, India and the Cape. There is, too, a fair inquiry for agricultural and builder's ironwork, mostly in both cases, on home account. The edge tool manufacturers are selling goods somewhat freely for the leading colonies, and there is said to be a slight improvement in the United States demand for chains, tin plates, fish hooks and birding guns. The hollowware manufacturers are pretty well engaged, and at their quarterly meeting on Thursday last resolved to make no change in prices. Nickel (refined) is now 5/ per lb.

#### SOUTH WALES AND MONMOUTHSHIRE.

The coal trade of South Wales remains in a most prosperous condition, albeit profits are said to be somewhat problematical. Last week no fewer than 131,184 tons were sent off from the Welsh ports. Cardiff alone contributed 104,000 tons of the aggregate. There is now, nevertheless, some uncertainty as to the continuance of this state of things, owing to the wages question already alluded to in this letter. The iron trade is very quiet, although last week's shipments were close upon 10,000 tons, mostly for India, Sweden and Canada. It is stated that the French, who are the best buyers of Welsh tin plates, are trying to make the plates themselves. Some cargoes of black plates have already been sent to France to be finished there.

#### THE METAL MARKETS.

have been quiet, but with no particular change in quotations.

Messrs. Von Dadelzen & North say: "Copper is quiet; Chili bars, g. o. b. have realized £69, while for parcels in Swansea, £60, 10/ has been paid. At the ticketings on Thursday, Cape ore went at 13 10/3, the average of the whole sale being 13 6 1/2 per unit. Wallaroo is still withheld from the market; trifling lots from second hands fetch high rates. Burra is quoted at £75 to £75, 10/ with little passing; English tough quoted £74, 10/ to £76; select, £76 to £77; strong sheets, £81; India sheets, £80. Tin is rather easier; small sales of Straits at £68, 5/ while a fair quantity of Australian has been sold at £67, 10/ to £67, 15. Dutch market quiet; Banca, 42 1/2; Billiton, 41 1/2. English ingot, £72 to £73. Tin plates are firmly held, but demand is slack. Lead, dull; English pig, £20, 7/6 to £20, 10/; soft Spanish, £20, to £20 2 1/2. Spelter.—Nothing doing; Silesian quoted £19, 15 to £20. Quicksilver was reduced to £7, at which price a good business was done; the importer now asks £7, 5 for Spanish. Antimony, £48."

Messrs. Kelly & Co. report thus: "The metal market is still afflicted by weakness and indecision. The production of pig iron goes on as wondrously large as ever, if not larger. This enigma at present is only to be solved in the supposition that it answers somebody's purpose thus to go on making it. We are told openly and continually that this is not so—that the 'surroundings of iron making kill it.' If this be true either in whole in part all we can say about it without giving offence to iron magnates is, that iron making takes 'a deal of killing,' and that we don't believe that the patient is at all likely to die at present. The multiplication of 'pigs' will have to go on. Iron must be obtainable cheaply. It will be so; and it being so the chances are in favor of a larger and still larger consumption of a material which is the only great substitute for wood, which is constantly getting dearer. 'Constructive iron' is astonishing on the increase. The requirements for the annual 15,000 new houses of London and its environs, even in remote places, entering comparatively humble buildings on the score of economy a little bright light is thrown upon the question recently somewhat puzzling, as to how it is, with iron exports materially diminished of late years and a 'larger present make' (without much 'going into stock'), the home consumption has increased."

The Mining Journal remarks: "The general appearance of our markets is without change, but in places a little speculative feeling has prevailed this week, arising more, perhaps, from unemployed capital than anything else; but as it might increase, it ought not to be overlooked, especially as the course of the money market invariably exercises a considerable influence over our markets, but more particularly when there is any disposition to speculate, for the rate at which money can then be obtained forms one of the principal items to be taken into calculation. A speculator should form his own judgment as to the increase of business and consequent risks, and be firm in his decisions, and either act promptly or do nothing at all—to hesitate is always fatal. We abstain from any expression of opinion here, because we do not think anything of sufficient importance has transpired yet awhile to necessitate our giving one, and we will add no more than our usual warning—be cautious, and do not be over sanguine about results, and then there will be less disappointment in the event of a failure, but we would advise moderation should prices im-

prove. A small profit with quick returns is the best principle to act upon at most times, but there are many reasons just now why sellers should not be too exacting, and if they are successful in obtaining a slight turn of the market in their favor they should be careful not to injure trade by demanding too much. Copper.—The fluctuations in the value of this metal from day to day have been trifling, for the most part not exceeding 5/ per ton. Tin.—The deliveries for the first half of this month, so far as can be ascertained, have been very fair, and the arrivals as yet have been very small, probably about a tenth only of the deliveries. The markets are quiet and very steady, but in the age of telegraphy there is no dependence upon them from one day to another, and although they may be nothing transpired to-day to outwardly influence them either one way or the other, yet to-morrow's news might create great excitement. Since the same means of judging of the merits of this metal are as much open to one as to another, we feel there is no occasion to offer any remark of our own as to the advisability of buying or selling at the present moment, as the nature and extent of the risks on either side are pretty generally known and understood. Quicksilver.—At the beginning of the week £7 was accepted for Spanish, but on Tuesday the price improved 2/6 per bottle, and on Thursday offers below £7, 5/ were declined. To-day sellers of Spanish are indifferent about selling even at the highest price, and there appears little chance of doing better. Tin Plates.—Prices have been quoted slightly higher, but orders cannot be obtained at the advance, and makers have had to give way again. Common Coke are obtainable at 17/6 to 17/9. Lead.—The price of English is quoted 5/ per ton lower, and the market remains very dull."

There is no change at Liverpool.

Iron: f. o. b. in Liverpool, per ton.

	£ s. d.	£ s. d.
Merchant bar.....	6 10 0 to 6 15 0	
" in Wales.....	6 0 0 to 6 5 0	
Staffordshire.....	7 0 0 to 7 15 0	
Hoop.....	7 10 0 to 8 10 0	
Sheet.....	8 15 0 to 9 15 0	
Nail rod.....	7 10 0 to 8 0 0	
Bar, best crown.....	7 0 0 to 8 0 0	
Boiler plates.....	9 0 0 to 10 0 0	

Tin Plates: f. o. b. in Liverpool, per box.

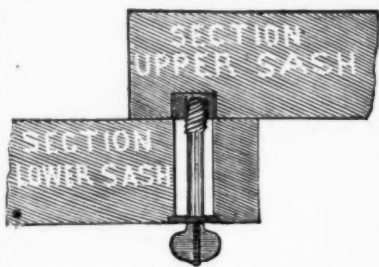
	£ s. d.	£ s. d.
Charcoal, I. C.....	1 2 6 to 1 4 0	
Coke, I. C.....	0 18 0 to 1 0 0	

Copper: Delivered in Liverpool, per ton.

	£ s. d.	£ s. d.
Bolt and sheathing.....	84 0 0 to 0 0 0	
Tin.....	78 0 0 to 0 0 0	
Tough cake.....	78 0 0 to 0 0 0	
Best selected.....	78 0 0 to 0 0 0	

#### Hoyt's Patent Window Fast.

We show in the accompanying illustration a new, simple and very effective sash fastener, styled Hoyt's patent sash fast. It draws the meeting rails firmly together, thus preventing rattling, and keeps out air, dust or snow. It is made all of brass, excepting the knob, which is bronze or nickel, as desired. It is made, also, to be worked



with a key instead of a knob; is easily put on without removing the sash, the only tools required being a 7-16 inch auger bit and screw driver. Three lengths are made to suit the various thickness of sash, and each length will answer for three sizes of meeting rails. In our Trade Report, under the heading of General Hardware, particulars regarding the price of these goods will be found. Messrs. Fernald & Sise, No. 100 Chambers street, are sole agents.

#### An Important Decision.

Surrogate Abram H. Dailey, of Kings county, delivered a decision in Brooklyn a few days ago which is of importance to gas companies, railroad corporations, and to executors of wills in which stock in such corporate associations is devised. It is the first of its kind delivered in the State of New York, and determines a question much discussed by lawyers, namely, the right of such companies to declare dividends on the proceeds of the sale of material, real estate, or privileges under a franchise, and the other question involved in the above, viz., What is capital and what is income from stock in such corporations? Sarah Demorest, a resident of Kings county, died in 1869, leaving her property, consisting of stock in the Brooklyn City Railroad Company and the Brooklyn Gas Light Company to her sister Eliza Demorest. The trustees of the will were Edward M. Schoonmaker and Charles Frederick. The property was left to Eliza Demorest for her life-time only, and was then to be distributed among a number of heirs named in the will. It was also provided that the executors could retain the stock, or sell it and reinvest in the same or stock of a similar kind, but it was not to be realized in cash during the life-time of the life tenant. While Eliza Demorest was living, the Brooklyn Gas Company sold out some of its main meters, and all its right to supply consumers within certain limits to two other companies. On the proceeds of this sale a dividend of 75 per cent. was declared to the stockholders, \$500,000 being the price or value of the material, and \$1,000,000 the estimated earnings in the relinquished district for a certain number of years named in the sale. The executors took these dividends in stock of the Nassau Gas Company in lieu of cash and sold them. They did not look upon them as income, but as a portion of the original principal, and hence they were not passed over to the life tenant. The latter died on the 4th of June, 1876, and the executors applied for a final settlement before ex-Surrogate Veeder on the 26th of September, 1876. The matter went over until January 4th last, and was

sent by ex-Surrogate Walter L. Livingston to W. H. Clements as Auditor. The family of Eliza Demorest claimed that the stock in the Nassau Gas Company belonged to the life tenant as income. The distributors under the original will claim that it was principal, and that she had, therefore, no right to it. N. H. Clements reported that the proceeds of the sale was in his judgment principal, and not income, and that the life tenant had no right to it. Surrogate Dailey confirmed this view, in an elaborate opinion, delivered recently. He holds that "dividends are only income when derived from the usual transactions incident to the objects and purposes of a corporation, and not when they are derived from a sale of its material or rights under a franchise granted to them." "A company," he says, "may sell its entire property and declare a dividend among its stockholders, and still certificates of stock be held as before. But what would they represent? If these extraordinary dividends should be treated by executors as income, and paid under a will to a life tenant, they could treat the proceeds of the sale of the entire property in the same way, and there would be nothing to pass to other heirs carefully named and provided for in a will."

Iron for Brazil.—The Tribune says: There are indications that the United States is about to enjoy an iron trade with Brazil. The bark Matthew Baird has cleared from Wilmington loaded with iron rails, and another vessel is to follow with a similar cargo. A Pennsylvania firm has secured a contract for railroad iron, and will ship some this summer. Wilmington has orders for a large number of cars, ten of them being for the Dom Pedro railway. A few locomotives have also been ordered. Then there is a growing business in street railway material. Years ago Stephenson sent cars and rails to Brazil, but lost the business at once, owing to English competition. An American who went to Liverpool and set up a street car establishment there was able to undersell Stephenson in South America. His cheaper labor in England and better ocean transportation enabled him to drive Americans out of the market. Latterly orders have begun to seek the American establishments again. Wheels and other material are being ordered from this city, and a business in rails and cars is confidently expected. There is no reason why a large business should not be done in this line. Railway material, delivered at the seaboard in the United States, may possibly cost a trifle more than in English ports, but there is something to offset this. Railway iron is a desirable class of ocean freights because it can be put into the hold of a ship and assist in steadying the vessel—a matter of some consequence when the bulk of the cargo is of flour, as it generally is, and the ship therefore top heavy and uneasy in the water. The desirability of railway material to the ship as freight and the shorter ocean route from New York to Brazil, will enable the stuff to be landed at ports beyond the Equator every dollar as cheaply as European material.

A letter from Birmingham, Ala., to the Louisville Courier-Journal says: The Red Mountain range is a solid mass of iron ore of fine quality. At one place the bank had been opened, and thousands of tons were piled up waiting to be transformed into useful articles. A company has been formed in Birmingham, and will shortly erect a furnace and rolling mill and utilize a portion of this iron deposit. I say a portion, for in the county in which Birmingham is situated I am told that there are twenty-five miles of the Red Mountain range which are nearly all solid ore. In this section of the State the deposits of coal and iron ore are immense enough to supply the world for ages. The question was, Could the coal be used to manufacture the iron? Making iron with charcoal was too costly a process. The Eureka Company, composed mainly of Louisville and Cincinnati capitalists, undertook to solve the problem, and established a furnace at Oxmoor, and did solve it in a most satisfactory manner. The coal makes the finest sort of coke.

#### WILSON BOHANNAN,

Manufacturer of Patent

#### BRASS

#### Pad Locks,

FOR

#### Railroad Switches,

Freight Cars,

AND THE HARDWARE TRADE

All sizes, with Brass and Steel Keys, with and without chains.

PASSENGER CAR LOCKS,

Bronzed, Nickel-Plated and Japanned.

BROOKLYN, N. Y.

Catalogues and Samples sent upon application.

#### CROSSLEY'S

#### Patent Stave Jointer.



The most Simple, Durable and Perfect Jointer made. In four sizes, jointing from 16 to 46 inches in length. In use from Maine to California. Is used by the largest stave and barrel manufacturers in the world. Will pay for itself in 30 days in saving of time and timber over any Saw Jointer ever used. Send for circular to

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# MICA.

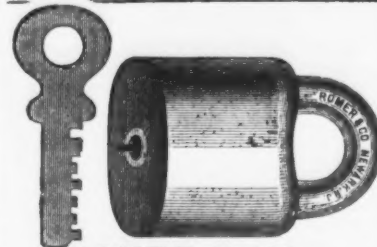
Miners of and Dealers in MICA of all Sizes.

MICA TO ORDER IN ANY PATTERN.

As we own extensive mines at Chester, Mass., and also in North Carolina, Stove Manufacturers and Hardware Jobbers are invited to communicate with us before contracting elsewhere.

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OFFICE, 87 Liberty Street, New York.



ROMER & CO.,

Established 1837. Manufacturers of Patent Scandinavian or Jail Locks, Brass Pad Locks for Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks, Patent Piano and Sewing Machine Locks, 141 to 145 Railroad Avenue, NEWARK, N. J. Illustrated Catalogue sent on application.

#### PATENT CONVEX

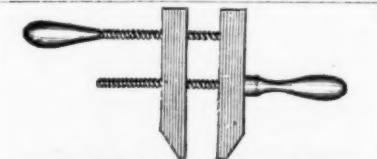
#### Fluting & Smoothing Iron.



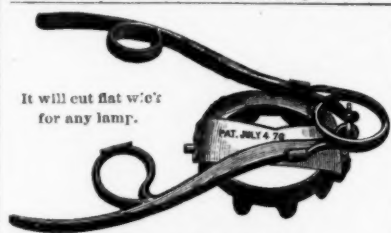
1st. It can be used as an ordinary Smoothing Iron. 2d. It is a fluting Machine as well as a Smoothing Iron. 3d. The Fluting Attachment being made of brass and convex in form, it has all the advantages of the crank machine. 4th. It combines the two articles in one, taking up the room of but one machine, and is always ready for use.

A. A. WEEKS, Manufacturer,

No. 83 John Street, New York.



R. BLISS MANUFACTURING CO.,  
Manufacturers of Hand and Bench Screws, Clamps, Chisel, Auger and Brad Awl Handles, Book Binders' Presses, Plows, Sewing Machines and Finishing Tool Handles, Croquet Games, Tool Chests, Toys and Novelties.  
Illustrated Catalogue and prices furnished on application.  
Pawtucket, R. I.



#### THE PERFECTION

#### Lamp Wick Trimmer.

An Article which every House should have.

It prevents smoking, saves chimneys, produces an even light, avoids chances of explosion by removing the burnt wick after cutting. It is the first trimmer ever made which cuts from both ends at once. Warranted to do its work perfectly for three years. Two of these sent for \$1.00, postage paid, on receipt of money order or money. Liberal discounts to the trade. Inclose 3c. stamp for prices and circular.

JAMES D. FOOT,

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#### CLOTHES WRINGER!



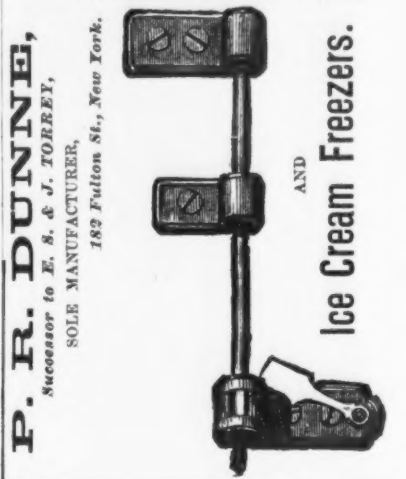
T. J. ALEXANDER, Manager,  
BOSTON, MASS.

#### UNIVERSAL, No. 2.

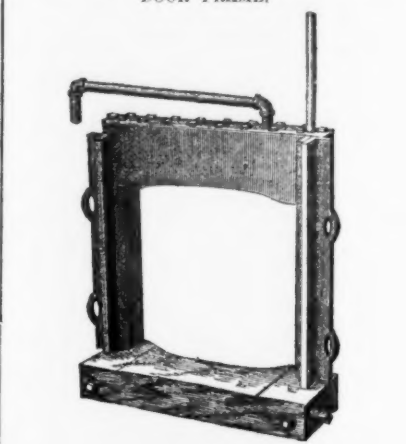
(Usual Family Size.)



#### "TORREY'S DOOR SPRINGS"



DOOR FRAME.



#### Longland's Patent

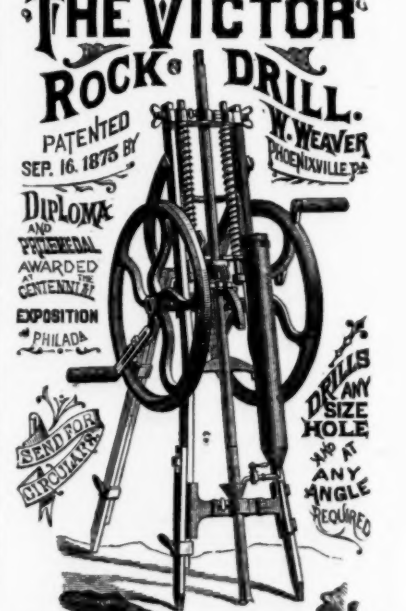
#### WROUGHT IRON DOOR FRAMES,

Boshes & Bridge Boshes,

For Puddling and Heating Furnaces, thereby saving a large percentage in ore, coal, fire brick and general repairs. This improvement is now in use in several of the best Mills in the country.

For particulars address

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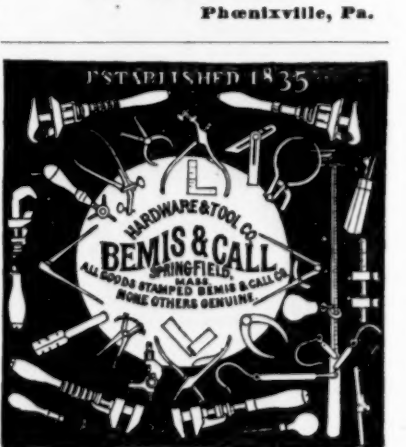


With this machine two men can do the work of six or eight by hand. Since it has become known at the Centennial Exposition it is being sent throughout the world. One party has already given an order for 25 machines.

For machines or agencies address

W. WEAVER,

Phoenixville, Pa.





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UPHOLSTERS, GIMP, CARPET, BRUSH TACKS, CIGAR BOX, FINISHING, CHAIR NAILS, BRADS AND PATENT BRADS, SHOE NAILS, AND SHOE TACKS, BRASS, SILVER AND JAPANNED, LINING NAILS, SADDLE NAILS, COFFIN TACKS, TUFFING, SUTTONS, AND NAILS, OF ANY COLOR.

## AMERICAN TACK CO.

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COMMON, CHISEL POINTED, AND COPPER BOAT NAILS. ANY SIZE OR STYLE OF TACK OR NAIL MADE FROM SAMPLE TO ORDER.

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And Beer's Patent Curtain Rollers, Concealed Hinges, Etc., Springs of any pattern made to order. Send for Circular and Price List.

## Steel Name Stamps.

N. Y. STENCIL WORKS,  
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**WM. J. NICOLLS,**  
CIVIL ENGINEER,  
Manufacturers' Agent in  
**RAILROAD SUPPLIES**  
5 Post Office Ave., Baltimore.

## L. COES' SCREW WRENCHES.

Genuine Improved Patent

Manufactured by

**L. COES & CO.,**  
Worcester, Mass.



We invite the particular attention of the trade to our New Straight Bar Wrench, *patented*, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to any strain the bar may be subjected to.

These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.

We would also call attention to the fact, that in 1869 we made several important improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes which were at once closely imitated and sold as the *Genuine Wrench* by certain parties who seem to rely upon our improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be good evidence that we manufacture a superior Wrench, we wish the trade may not be deceived on the question of originality. Trusting the trade will fully appreciate our recent efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped

"L. COES & CO."

Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.  
**HORACE DURRIE & CO., Sole Agents.**



## HOGEN ELBOW COMP'Y,

MANUFACTURERS OF PATENT

### Sheet Metal Elbows.

This Elbow has no crimps, cavities or angles, which cause accumulations that rust or corrode the iron, and it is also easily polished and kept clean.

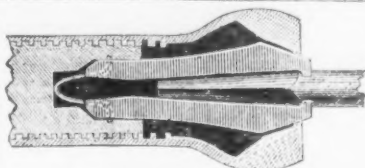
WORKS—Foot of Wasson St., near Lake Shore, CLEVELAND, O.

## THE AMERICAN WIRE NAIL CO.,

Manufacturers of

Molding, Trimming, Upholstering & Finishing Nails, Escutcheon Pins and Wire Nails

Of all kinds and sizes, with Flat, Oval, Depressed, or Countersunk Heads, with or without points. Warranted Well Made and of Superior Quality. OFFICE AND WORKS, Covington, Ky.



This Cut Represents the Jaws of the Barber Bit Brace.

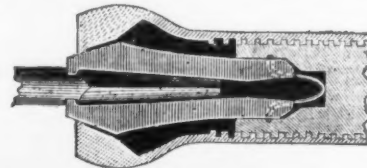
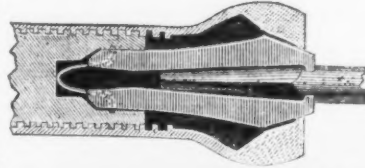
The United States Court recently decided that the Millers Falls Company has the exclusive right to make this style of Brace Jaws, and a higher court long ago decided that they are the only jaws which will hold tools of any size or shape.

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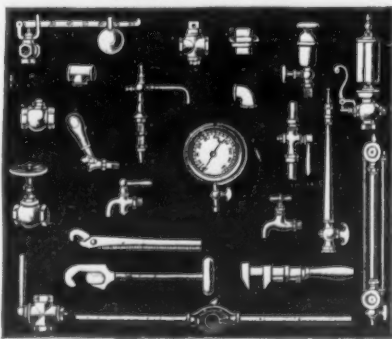
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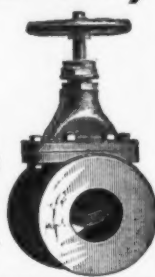
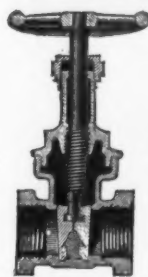
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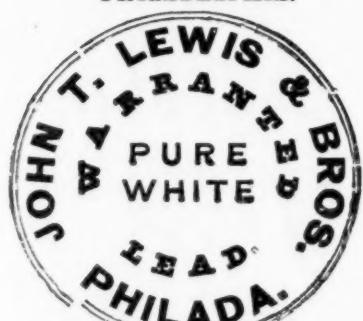
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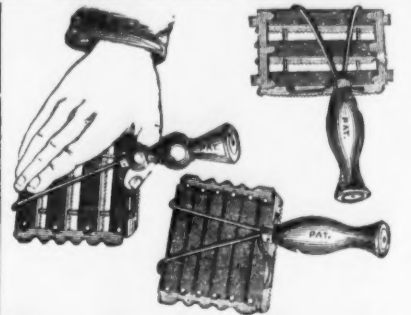
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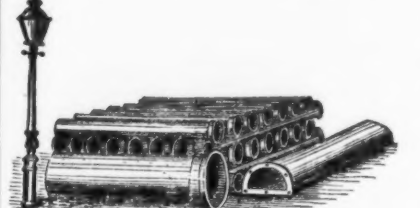
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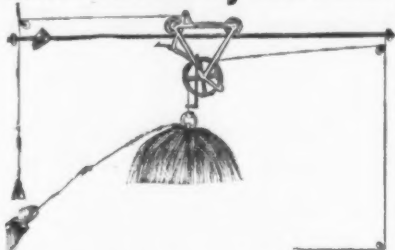
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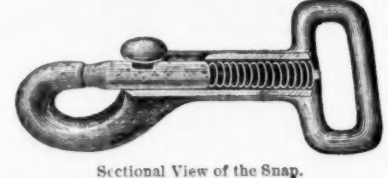
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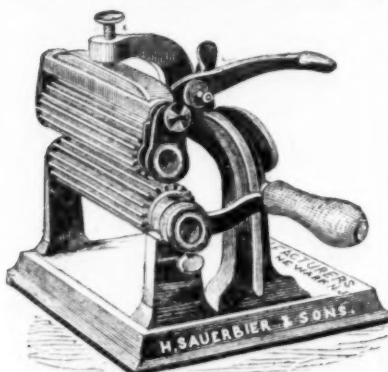
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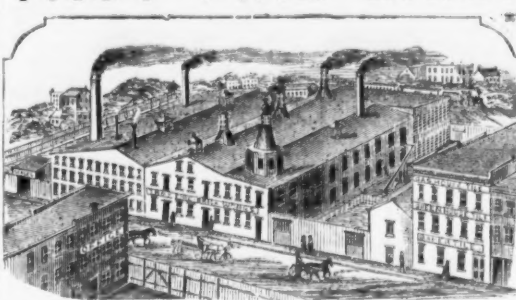
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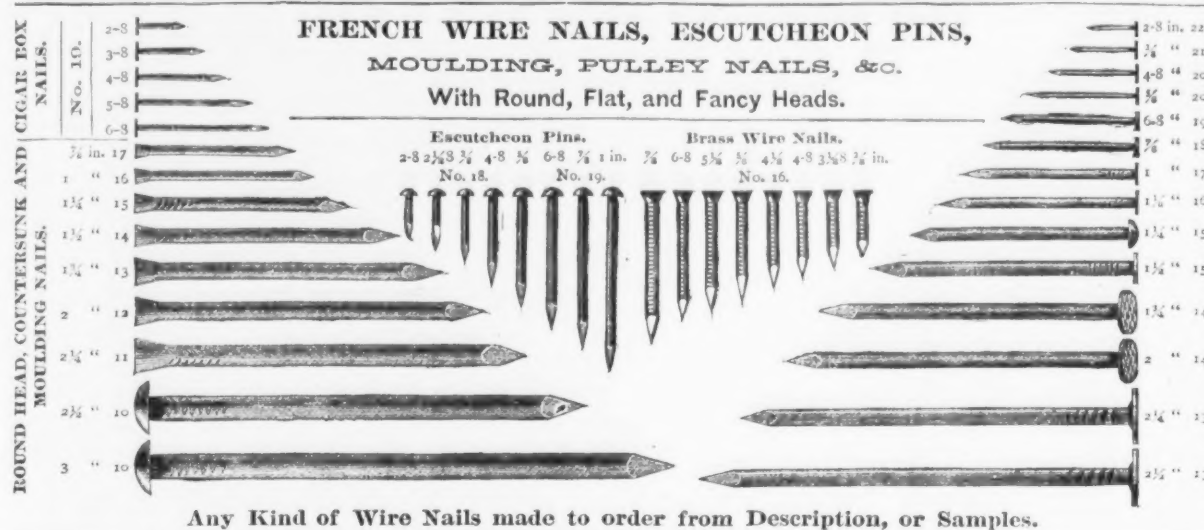
Bell Metal Kettles.



# HOBART'S TACKS

MANUFACTURED BY  
**DUNBAR, HOBART & WHIDDEN,**  
ESTABLISHED 1810.

Office and Salesroom, 116 Chambers Street, New York. . . . Factory, South Abington, Mass.



## American and Swedes Iron Tacks,

Tinned, Leathered and Large Head Carpet Tacks, Finishing Nails, Black and Tinned Trunk Nails, Miners' Copper, Gimp, Lace and Brush Tacks, Hungarian, Chair, Cigar Box and Barrel Nails, Glaziers' Points, Iron, Steel, Copper and Zinc Shoe Nails, Patent Improved Brass Shoe Nails, Heel and Toe Plates, Steel Shanks, and Fancy Head Nails, Silver or Japanned Lining and Saddle Nails, A full assortment always on hand at salesrooms, for immediate delivery if required. Odd and Irregular Sizes made to order or cut from sample at short notice. Send for Price List.

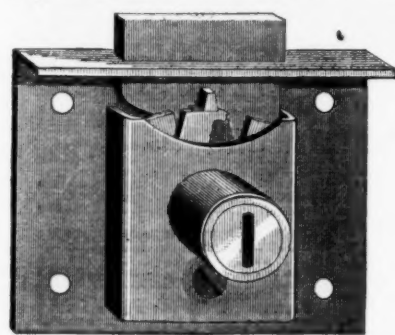
## IRON-BOUND FRENCH BOOT POLISH.

Extra Quantity and Quality.  
RETAILS AT 15 CENTS.  
Price Per Gross \$12. Discounts to Jobbers only.



**THE SPRAGUE NOVELTY WORKS, Rochester, N. Y.**

W. M. ERNST, Sales Agent, 26 Cliff Street, New York.



List Price, - - \$8.50 per dozen.

### A NEW Drawer Lock.

THE  
"STANDARD."

Applicable also to Cupboards, etc.  
Made wholly of Brass, and finely finished. Each Lock has two flat, steel, nickel-plated Keys.  
Dealers desiring to examine this Lock will receive a sample without charge, by addressing

**The Yale Lock Mfg. Co.,**  
STAMFORD CONN.

### D. W. HAZLETON & CO

724 Girard Ave., Philadelphia  
Manufacturers of

### Curry Combs

Galvanized Square  
and Ornamental

Conductor Pipe  
RIBBED TUBING

Stamped & Press  
Work to order.

Correspondence Solicited.

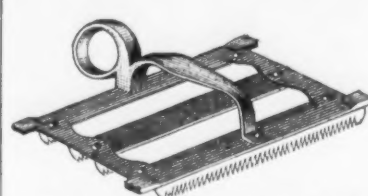


We call the attention of Hardware Dealers to our Double Curry Comb, comprising a fine and coarse side; or virtually two combs in one. It is useful, durable and novel, and needs no argument to convince any one of its practicality. It sells on sight, and is bound to supersede all other combs. We want one reliable dealer in each state or large city to handle it. Correspondence solicited. Address  
**L. N. CASSELL, Fredericton, Ohio.**

### FAC-SIMILES

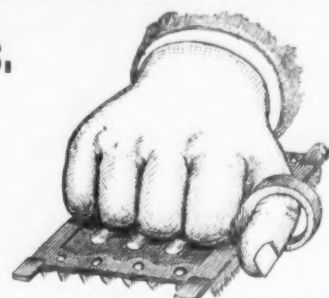


## Hotchkiss' Novelty Combs.



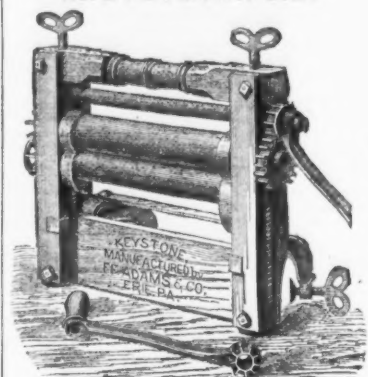
We ask the attention of the public to our Patent Novelty Carry Combs, represented above, which are universally acknowledged to be far superior to anything in the market, being neat and durable and the most convenient to handle of any Comb yet produced. They are put up in paper boxes of one dozen each, and packed 24 dozen in a case. Give them a trial.

For sale by the jobbing Hardware, Saddlery and Woodenware trade.  
**HOTCHKISS' SONS, Bridgeport, Conn.**  
Office and Warerooms, 113 Chambers Street, New York.



## KEYSTONE WRINGERS.

No. 2 1-2 Purchase Gear.



No. 1, Wood Frame without Gears.  
No. 2, Iron  
No. 2 1/2, Wood Frame, Purchase Gear.  
No. 3, Iron  
No. 10, Wood  
All have 1 1/2 in. by 10 in. Rollers.

Protection in Sale Guaranteed.

Other Household Goods for Home  
and Export Trade.

**F. F. ADAMS & CO.**

ERIE, PA.

CHAS. D. & W. S. GRAHAM,  
No. 88 Wall Street, New York,  
AGENTS.

## Harvey W. Peace, Vulcan Saw Works.

Manufacturer of every kind of

### Patent Ground SAWS.

Union Avenue, Tenth and Ainslie Streets, BROOKLYN, E. D., N. Y.



Circulars, Cross-Cuts, Mill,  
Mulay, Gang, Hand,  
and Butcher.  
Molding and Planing Knives.  
Plastering Trowels, Miter-  
ing Rods, &c.

## E. M. BOYNTON,

Manufacturer of all kinds of

First-Class Saws, Saw Frames, Cross-Cut Handles, Tools, Files, &c.  
Also Sole Proprietor and Mfr. of the Genuine Patent Lightning Saw,  
No. 50 Beekman Street, NEW YORK.

Special attention is called to my new Centennial Saw, patented March 28th, 1876; Special File and Saw-Set combined, patented June 30th, 1876; Cross Cut (Loop) Saw Handle, patented February 15th, 1876; New One-Man Saw, with Patent Double Removable Handle Attachment, March 28th, 1876; New Patent Champion Clearer Tooth, patented August 15th, 1876; Saw Set, patented Nov. 25th, 1873—a perfect Set that a blind man can use to condense like a Hammer Set perfectly; Cross-bar Wood Saw Frame, patented Nov. 12, 1872; also Cross-Cut Handle, with castings, patented Feb. 15, 1870. These goods complete the scientific tools for cutting timber, instead of wasting it off with notched V teeth (which are like a fractured plate sharpened).

AWARDED CENTENNIAL MEDAL AFTER ACTUAL TEST.



REPORT ON AWARDS. PHILADELPHIA, November 11th, 1876. GROUP No. 15.  
Product: Saws in great variety: special improvement in shape of teeth, called Patent Lightning Saw.  
Name and Address of Exhibitor: Eben Moody Boynton, New York.  
The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for award, for the following reasons, viz:  
Report: "Being of very Superior Quality and of great Practical Utility."  
J. D. IMBODEN, of Virginia, CHARLES STAPLES, of Maine, G. L. REED, of Penn.,  
J. DIFENBACH, of Germany, DAVID MCHARDY, of Scotland, D. STEINMETZ, of Phila. Judges.  
A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.  
Given by authority of the U. S. Centennial Commission. J. L. CAMPBELL, Sec'y. A. T. GOSHORN Director General. J. R. HAWLEY, Pres.

**E. C. ATKINS & CO., Indianapolis, Ind.,**  
Saw Manufacturers and Repairers.  
Sole manufacturers of the celebrated  
**GENUINE SILVER STEEL DIAMOND X CUT SAW.**

\$1.50 Per Foot.



Beware of the Imitation Called "DIAMOND TOOTH."

## Wheeler, Madden & Clemson

MFG. CO.,

MIDDLETOWN, - - - NEW YORK.

Manufacturers of  
**WARRANTED CAST STEEL**

## SAWS

Of every description, including  
Circular, Shingle, Cross-Cut, Mill, Hand,  
**WOOD SAWS. Etc., Etc.**

**AMERICAN SAW CO.,**

Manufacturers of

Movable Toothed Circular Saws,  
**PERFORATED CROSS-CUT SAWS**  
And SOLID SAWS of all kinds. Trenton, N. J.

## TO MANUFACTURERS & DEALERS IN SKATES.

### CAUTION.

A re-issue of letters patent Aug. 13, 1874, No. 154,176, re-issued May 4, 1875, No. 6,410, re-issued Feb. 20, 1877, No. 7,524, application filed Nov. 14, 1876, having been granted to Oliver Edwards, all manufacturers and dealers are notified that they must cease making or selling any skates infringing the same. Special attention is invited to claim 8, "a skate-runner having its bottom constructed with a laterally projecting rib and its standards provided with plate supporting brackets, all made in a single piece of metal, substantially as and for the purpose described."

Nearly every cheap, all-metal skate in the market infringes this claim. Manufactured only by the  
**FLORENCE MACHINE CO., Florence, Mass.**



[illegible]



Fancy Wire not less than 16c. per lb. advance of  
 Round Wire.  
 Brass Rods, No. 9 and smaller not less than 2 feet  
 lengths, 45c.  
 Wire straightened and cut, smaller than No. 8, and  
 not less than 2 feet lengths, 45c.  
 Wire and Rods less than 2 feet lengths, special rates.  
 Twelve cents per lb. for wire for stouffing on 1 lb. spools.  
 MISCELLANEOUS.  
 Common Plain Brass Flat Bars..... \$0.40  
 Brass Door Rail..... 35  
 High Brass Scrap, 16 cents.  
 18 cents.  
 Sliding, 20 cents.  
 Turnings, Filings and Chips..... the price of Scrap.  
 Terms—Net Cash. Interest be added after thirty  
 days.  
 TUB. 60.  
 1 lb. to No. 20 inclusive, above 3 in. to 5 in..... \$0.40  
 " above 3 in..... 35  
 Nos. 21, 22, 23, two cents advance on List for each  
 Number.  
 Above 24 c. special rates.  
 Plain & Iron..... 75  
 " 3 1/2 "..... 70  
 " 4 "..... 65  
 All Mandrel Drawn Tubes..... 1.00  
 Prices.  
 Above 30 c. to No. 20..... 48c  
 English, Scotch and Extra Patterns Fancy Tubing  
 to No. 30..... 1.00  
 Turning Scales or Cut to 4 feet long, 2 cents ad-  
 vance on List.  
 Add to 2 cents 1/2 cent for each additional cutting  
 and 10 c. for each extra cutting.  
 All Mandrel Drawn Tubes under 8 in., 25 cents per  
 pound advance.  
 ZINC TUBING.  
 Plain..... 35  
 Fancy..... 30  
 Scotch and Extra Patterns..... 30  
 4 Per Cent..... 75  
 6 "..... 70  
 12 "..... 65  
 16 "..... 60  
 20 "..... 55  
 SPEEL—At 10 c. per lb. for extra  
 at 1 cents per lb., or under, 3/4 cents; over 1 cent, and  
 not above 1 1/2 cents per lb., over 1 1/2 cents per lb. for  
 10 lb. val. and under, 1 1/2 cents per lb. for 1 lb.  
 way bars, in steel, 1 cent per lb. Provided, that  
 Metal cemented, cast or made from iron or by the Besse-  
 mer and other processes, of whatever form or de-  
 scription, shall be classed as  
 American Cast Steel.  
 Teo..... 15 @ 16  
 Spring..... 12 @ 13  
 Homogeneous..... 12 @ 13  
 30 in. 12 @ 13  
 Machinery Round and Square..... 10 @ 11  
 File..... 11 @ 12  
 Sheet..... 14 @ 16  
 Sawn Plate, Gang and X cut..... 13 @ 14  
 circular as to size..... 15 @ 16  
 Tool..... 20 @ 21  
 Tool, extra fine..... 20 @ 21  
 Spring..... 12 @ 13  
 Machinery..... 10 @ 11  
 Hammer..... 15 @ 16  
 Gun Hammer..... 15 @ 16  
 English Steel, payable in gold, net.  
 " Best Cast..... 17 @ 18  
 " Best Double Shear..... 17 @ 18  
 " Round Machinery, Cast..... 17 @ 18  
 " Swaged Cast..... 17 @ 18  
 " Best Cast Steel..... 17 @ 18  
 " Billet, 1st quality..... 17 @ 18  
 " 2d quality..... 17 @ 18  
 German Steel, Best..... 17 @ 18  
 do 2d quality..... 17 @ 18  
 Sheet Cast Steel, Cast quality..... 17 @ 18  
 do 2d quality..... 17 @ 18  
 File Steel, Flat and Sheet, 3d quality..... 17 @ 18  
 " Square and Round..... 17 @ 18  
 " Mill..... 17 @ 18  
 " Taper 3 and 5/8 inch..... 17 @ 18  
 " Taper 3 and 5/8 inch..... 17 @ 18  
 ANTIMONY..... 19 @ 19 1/2 currency  
 LEAD—DUTY: Fig. #1 per 100 lbs. of Lead, 1 1/2 cts.  
 per lb. Pipe and Sheet, 2 1/2 cts. per lb.  
 English..... 19 @ 19 1/2  
 German Refined..... 19 @ 19 1/2  
 " 1st quality..... 19 @ 19 1/2  
 " 2d quality..... 19 @ 19 1/2  
 " 3d quality..... 19 @ 19 1/2  
 " 4th quality..... 19 @ 19 1/2  
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 " 114th quality..... 19 @ 19 1/2  
 " 115th quality..... 19 @ 19 1/2  
 " 116th quality..... 19 @ 19 1/2  
 " 117th quality..... 19 @ 19 1/2  
 " 118th quality..... 19 @ 19 1/2  
 " 119th quality..... 19 @ 19 1/2  
 " 120th quality..... 19 @ 19 1

CASHE.	.....	Black.	.....
Dryer, Patent, Am'n.	.....	best cans, U.S.A.	keg
Floors.	.....	English.	16c.
Glass.	.....	White.	30
Glaziers' Points, Zinc.	.....	Sheet.	.....
Gum, Copal.	.....	Desmar.	.....
Litharge.	.....	Sbeilac, English.	.....
Pumice Stone, selected Lumps.	.....	Dark.	.....
Putty in bladders.	.....	powdered.	.....
"    in bulk.	.....	.....	.....
Rotten Stone, soft, English.	.....	.....	.....
Spirits Turpentine.	.....	.....	.....
Whaling, Swedish.	.....	.....	.....

**Glass.**

FRENCH WINDOW GLASS.  
Prices current per box of 50 feet.

SIZES.		1st.	2d.	3d.	4th.
6 x 8 to 10 x 15.	.....	\$7.50	\$6.75	\$6.25	5.75
11 x 14 to 16 x 24.	.....	8.50	7.75	7.25	6.50
16 x 24 to 30 x 30.	.....	10.75	9.75	9.25	8.50
15 x 36 to 24 x 30.	.....	12.25	10.75	9.90	.....
15 x 38 to 24 x 36.	.....	13.00	11.50	9.75	.....
15 x 38 to 36 x 44.	.....	14.50	12.75	10.75	.....
26 x 46 to 30 x 50.	.....	17.00	14.00	11.25	.....
30 x 51 to 30 x 54.	.....	16.00	14.50	12.00	.....
30 x 56 to 30 x 60.	.....	17.50	15.50	13.00	.....
34 x 58 to 34 x 60.	.....	18.25	17.25	15.00	.....
36 x 60 to 40 x 60.	.....	20.75	18.75	17.25	.....

Double Thick.—Discount 6% to 10 %.

SIZES.		1st.	2d.	3d.	4th.
6 x 8 to 10 x 15.	.....	\$12.00	\$11.00	\$10.00	9.00
11 x 14 to 16 x 24.	.....	13.75	12.50	11.75	10.50
16 x 24 to 30 x 30.	.....	17.25	15.75	14.50	.....
15 x 38 to 24 x 30.	.....	19.75	17.25	14.50	.....
15 x 38 to 24 x 36.	.....	21.00	18.50	15.75	.....
15 x 38 to 36 x 44.	.....	23.50	21.25	17.25	.....
26 x 46 to 30 x 50.	.....	24.00	22.50	19.00	.....
30 x 52 to 34 x 54.	.....	25.25	23.25	19.25	.....
30 x 56 to 34 x 58.	.....	27.25	25.00	21.50	.....
34 x 58 to 34 x 60.	.....	29.25	27.75	24.00	.....
36 x 60 to 40 x 60.	.....	32.25	30.00	27.75	.....

Sizes above 40 x 60—10.00 per box extra for every five inches.

An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 34 inches in length, and not making more than 51 united inches, will be charged in the 34 united inches bracket.

## T & CO.,


Merchants, Buffalo, N. Y.

FACTURERS OF

### POST HOLE AUGER.

durable, and the handiest Earth Auger in market for boring three holes while any other auger is boring one hole readily in clay, sand, gravel, or muck soil, or root sods without the use of shovel or spade to clear them out.

Users in use are easily broken, bent and disabled by strong pressure. The "Fitchner" Auger will stand its peculiar construction enables it to cut by such a manner as to push itself speedily and



ations, such as old filling of the scraps, sticks made soil, and roots, grubbing, etc., in new other styles of post augers are broken and bent. more than others, but the purchaser will neverthe

ger is drawn from the hole ; it brings all the dirt and emptied. Strongly made, simple and handy manner of cutting. Always ready for use.

market, and we offer to the trade a liberal discount each. Retail price, net, \$3.30 each. Less 20 per cent.

**T & CO., New York Agents.**

---

## BRIDGE & CO.,

Street, New York.

### Fitchner Ice Tongs

MADE FROM  
Best Refined Bar Iron.  
**POINTS CASE HARDENED.**

.....	\$2.25 per dozen
.....	3.75
.....	3.00

---

## CLINTON

### Window Screen Wire Cloth.

MISHED 1836.

## BOARDS.

Series.



"DOUBLE RIM."

### Oblong, Thirty Sizes.

ome bevel edge to match the present style of stove is the Board made by us during the past five years, e top appearance as the Iron-Clad, and the beading is raed under the full width of the bead.

CTURED BY

## PARD & CO.,

Buffalo, N. Y.

### PUMPING WORKS.



## Steel.

# SULZBACHER, HYMAN, WOLFF & CO.,

IMPORTERS OF

## IRON AND STEEL.

Sole Agents for the Sale of the Celebrated  
Pr. HOMOGENEOUS DEC.' CAST STEEL, GUN BAR-  
RELS, MOULDS AND ORDNANCE.

Sole Agents for **COCKER BROTHERS, Limited.**

Successors to  
SAML. COCKER & SON, (ESTABLISHED 1752.)

**SHEFFIELD, ENGLAND.**

Sole manufacturers of

**"SC" EXTRA Cast Steel,**  
AND  
CAST STEEL WIRE FOR ALL PURPOSES.  
Sole makers of COCKER'S "METEOR" WIRE PLATES.  
Railroad Supplies and General Merchants.  
Office and Warehouse, 46 Cliff Street, New York.

## F. W. MOSS,

Successor to JOSHUA MOSS & GAMBLE BROS.

FRANKLIN WORKS,  
WADSWORTH BRIDGE WORKS,  
WALKLEY WORKS.

**SHEFFIELD, ENGLAND.**

## STEEL AND FILES.

Principal Depots: 80 John St., N. Y., and 512 Commerce St., Phila.

MOSS & GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,

Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

WARRANTED CAST STEEL, especially adapted for DIES and TURN-  
ING TOOLS, DRILLS, COLD CHISELS,  
PUNCHES and all kinds of MACHINISTS' TOOLS.  
Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools,  
warranted not to crack in hardening. Taps of any size.  
Swede Spring Steel, especially adapted for Locomotive and Railway Car Springs.  
English Spring and Plow Plate Steel.

Sheet Cast Steel Shear, German, Round Machinery, Hammer, Fork and Shovel Steel  
**GENERAL MERCHANT.**

## Isaac Jenks & Sons,

MINERVA AND BEAVER WORKS, WOLVERHAMPTON, ENGLAND.

MANUFACTURERS OF

"JENKS" SPRING STEEL, "MINERVA" SWEDES, AND "ANGLO" CAST SPRING STEEL

"JENKS" TIRE, TOR CORE, SLEIGH SHOE, BLISTER, AND PLOW STEEL;

ALSO,

"BEAVER" PLOW, TIRE, AXE, AND SHEET IRON.

ISAAC JENKS, Jr., Representative, 245 Pearl and 20 Cliff Streets, N. Y.

## FRANCIS HOBSON & SON,

97 John Street, NEW YORK,

Sole Manufact'rs of **"CHOICE" Extra Cast Steel.**

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

CHAS. HUGILL, Agent.

## S. & C. WARDLOW,

Sheffield, England,

Manufacturers of the Celebrated

**Cast and Double Shear  
STEEL.**

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives,  
turning Tools, Dies, Files, Clock and other Springs, and Tools of every variety.

Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

Established 1810.

## J. & RILEY CARR,

SHEFFIELD, ENGLAND.

Manufacturers of the "Celebrated"

**"DOG BRAND" FILES.**

Also of Superior

**STEEL**

For Drills, Cold Chisels, Tools, Taps, Dies, &c.

COLD ROLLED STEEL for Clock Springs, Corsets, &c.

SHEET CAST STEEL for Springs, Saws, Welding and Stamping Cold, &c.

GERMAN, MACHINERY, ENGLISH AND SWEDS SPRING STEEL.

And all other descriptions for machinists and agricultural purposes.

Warehouse, 30 Gold Street, New York.

(Near John Street.)



STANCH

HENRY MOORE, Agent.

## Steel.

## SANDERSON BROS. STEEL COMPANY,

GEDDES WORKS, Syracuse, N. Y.

Manufacturers of the Celebrated

**SANDERSON BROTHERS & CO.'S**

## CAST STEEL,

Warranted most SUPERIOR and UNSURPASSED for  
**TOOLS and GRANITE ROCK DRILLS.**

EDWARD FRITH, Treasurer, 16 Cliff St., New York.

WILLIAM A. SWEET, General Manager, Syracuse, N. Y.

A full assortment of this universally approved OLD BRAND of English Steel

For Sale at

16 Cliff Street, NEW YORK.

## SWEET'S MANUFACTURING COMPANY

SYRACUSE, N. Y.

Manufacturers of "SWEET'S" celebrated

## STEEL GOODS.

Sweet's Excelsior Tire Steel.

Sweet's Oil Tempered Black Seat Springs.



COLD

SLEIGH SHOE STEEL.  
MACHINERY STEEL.  
SPRING STEEL.

CALKING STEEL.  
KNIFE BACK STEEL.  
STEEL CROW BARS.

STEEL CUTTER SHOES.  
"HARROW TEETH."  
"TOE CALKS."

AND ALL KINDS OF ROLLED AND HAMMERED STEEL.

W. A. SWEET,  
President.

J. M. SCHERMERHORN, Jr.,  
Treasurer.

FRED. B. CHAPMAN,  
Secretary.

**LABELLE STEEL WORKS.**

## SMITH, SUTTON & CO.,

MANUFACTURERS OF ALL KINDS OF

## STEEL.

Also, Springs, Axles, Rake Teeth, &c.

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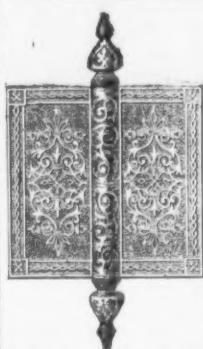
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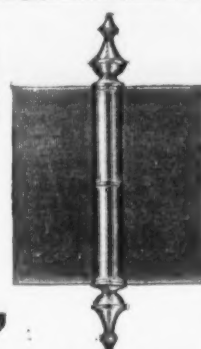
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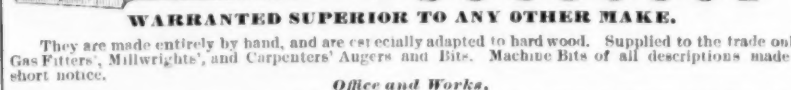


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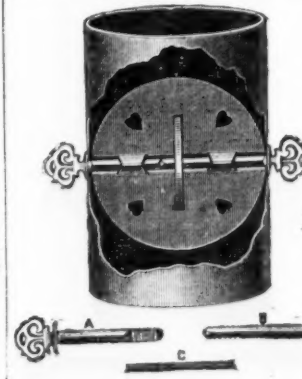
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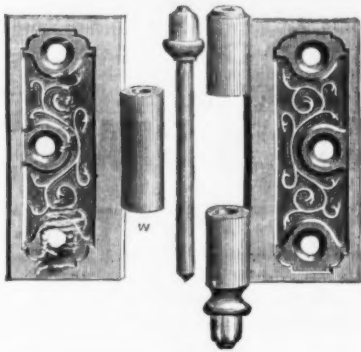
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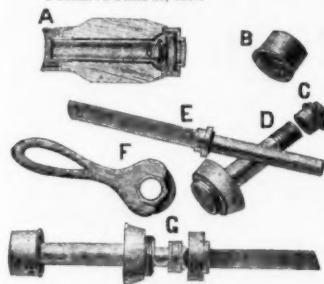
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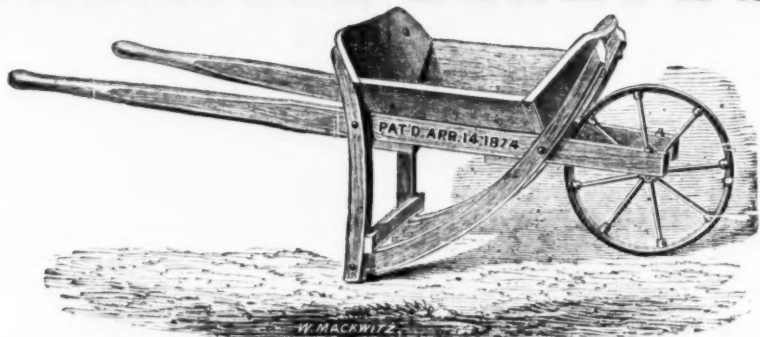
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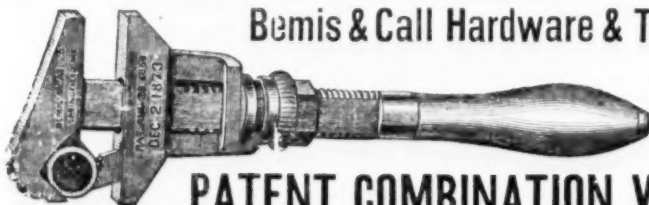
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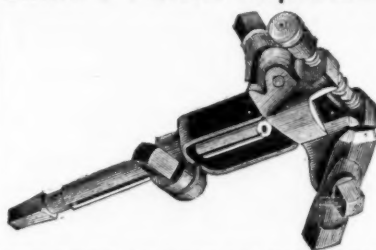
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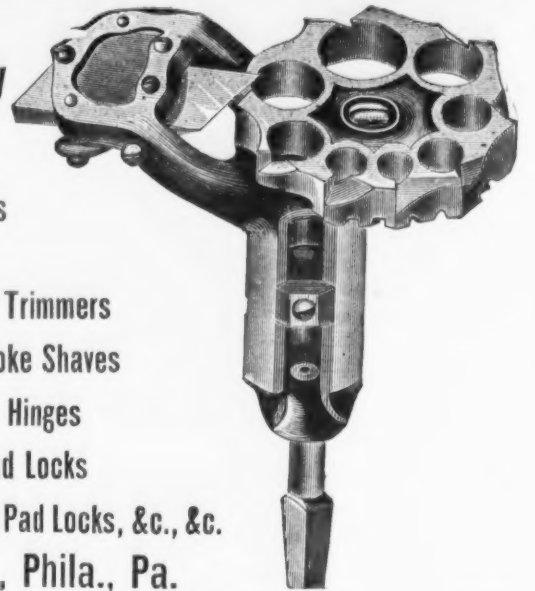
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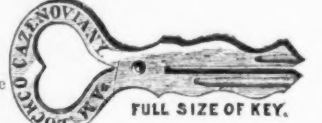
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CORK  
PRESSERS.



BUNG HOLE  
BORERS.  
—  
SAUSAGE  
STUFFERS.  
—  
FRUIT,  
LARD  
AND  
JELLY  
PRESSES.  
—  
TINCTURE  
PRESSES.  
—  
SELF-  
WEIGHING  
CHEESE  
KNIVES.  
—  
&c., &c., &c.

**Enterprise Mfg. Co.**

Make the

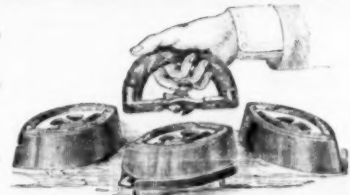
Only Irons Filled with

Non-Conducting

**FIRE CEMENT.**

Send for circular and price

list.



**MRS. POTTS'**  
Cold Handle Smooth-  
ing and Polishing  
Irons

Are made by

**Enterprise Mfg. Co.,**

PHILADELPHIA,

And sold by

**The Hardware Trade.****V. G. HUNDLEY.**

79 Reade Street, New York.

**North Carolina Handle Co.,**

Manufacturers of

SPOKES, AXE, PICK, SLEDGE, HAMMER, HATCHET and other HANDLES.

Full assortment always on hand.



PHILADELPHIA.

(Corrected weekly by Lloyd, Silliman & Walton).

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

**Anvils.**  
Peter Wright's, # 1, gold, 11 @ 10.50  
Whitman's, 11 @ 10.50  
Eagle, 9 cents per lb.—dis 3.75  
**Apple Parers.**—Domestic, per doz \$ 6.50  
Peach Parer, 10 50  
Bay State Parer, Corner and Silver, 12 50  
Other makes, 7 50  
Lots of 5 to 25 dozen special price.

**Axes.**  
Main's (according to weight), Per doz \$10 00 @ 9 00  
Red Indian, 10 50 @ 9 50  
Red Chieftain, 11 00 @ 10 10  
Hunt's, 12 50 @ 11 50

**Augers and Auger Bits.**  
Benjamin Pierce, dis 35 @ 41 50  
Poulsen & Ives, dis 35 @ 41 50  
Connecticut Valley Auger Bits, dis 35 @ 41 50  
Cook's Bit, dis 35 @ 41 50  
Jennings' Bit, dis 35 @ 41 50  
Bates' Bit Augers, dis 40 @ 46 10  
Douglas & Ives' Augers, dis 45 @ 51 50  
Watrous Ship Augers, dis 45 @ 51 50  
Bonney's Pat. Hollow Augers, dis 45 @ 51 50  
Stearns' Patent Hollow Augers, dis 45 @ 51 50

**Balances.**  
Light or "common", dis 25 @ 28 10  
All other Sorting Balances, dis 25 @ 28 10

**Bells.**—Bevin Bros. Mfg. Co. Light Hand Bells, dis 70 @ 75  
Hand, Common, dis 70 @ 75  
Swiss Patent Hand Bells, dis 70 @ 75  
Connell's Door Bell, dis 70 @ 75  
G. Western & Kentucky Cow, new list, dis 40 @ 45

**Boring Machines.**—Bates Mfg. Co., com. plate with augers, dis 25 @ 25 10  
Douglas Mfg. Co., complete with augers, dis 40 @ 40 10  
Common boring Machines, no Augers, \$3 15 net  
Anceur, 4 00 net

**Bolts.**—Eastern Carriage Bolts, dis 70 @ 75 50  
Western, dis 70 @ 75 50  
Philadelphia, dis 70 @ 75 50  
Coleman, dis 70 @ 75 50  
Wrought Shutter, Stanley, dis 70 @ 75 50  
Fairbanks, dis 70 @ 75 50

**Braces.**—Barber's, dis 50 @ 56 10  
Packers, dis 50 @ 56 10  
Bartholomew's American Ball, dis 50 @ 56 10  
Spotnaw, dis 50 @ 56 10

**Bushes.**—Cast Fast Joint, Narrow, dis 20, 17 1/2 @ 19 1/2  
Broad, dis 40, 12 1/2 @ 14 1/2  
Cast Loose Joint, dis 50, 12 1/2 @ 14 1/2  
Acorn, dis 50, 12 1/2 @ 14 1/2  
Acorn, Jap'd, dis 50, 12 1/2 @ 14 1/2  
Mayers and Parliament, dis 40, 12 1/2 @ 14 1/2  
Lull & Porter's (Phila.) Hinges, dis 40 @ 45 1/2  
Wrought Loose Pin, dis 40 @ 45 1/2  
Table Hinges and Back Flaps, dis 40 @ 45 1/2  
Narrow, dis 40 @ 45 1/2  
Loose Joint, dis 40 @ 45 1/2

**Blind Butts.**  
Parker, dis 70 @ 70 10  
Buffalo Hard, dis 60 @ 60 10  
Clark, dis 60 @ 60 10  
Shepard, dis 60 @ 60 10  
Garretson, dis 60 @ 60 10

**Chains.**—German Hammer and Coll., dis 25 @ 25 10  
Galvanized Pump, dis 25 @ 25 10  
Best Proof Coll Chain, dis 25 @ 25 10  
By the case, 500 lbs., 1/2 c per lb. less Common Chain, 1/2 c per lb. less

**Chisels.**—Saw, dis 60 @ 60 10  
Socket Framing, dis 60 @ 60 10  
Tang, dis 60 @ 60 10  
Beatty's Framing and Firmer, dis 2 1/2 @ 2 1/2  
Custers, dis 40 @ 40 10  
Porcelain Wheel Bed, dis 40 @ 40 10  
Iron and Brass Wheel Plate, dis 50 @ 50 10  
Porcelain Wheel, dis 50 @ 50 10

**Coffee Mills.**—Common Box and Side, dis 25 @ 25 10  
Patent, dis 25 @ 25 10  
Coffey, American Pocket (best), dis 25 @ 25 10  
Landers, Frary & Clark, J. Russell & Co. and Lanson & Goodnow Mfg. Co. Manufacturers' net prices

**Drawing Knives.**  
Hull Mfg. Co., dis 60 @ 60 10  
Adjustable Handle, dis 10 @ 15 @ 15 1/2  
Beatty, dis 15 @ 15 1/2

**Fry Pans.**  
Tinned, dis 40 @ 40 10  
No. 1, 40 @ 40 10  
No. 2, 40 @ 40 10  
Burnished, dis 40 @ 40 10  
No. 1, 40 @ 40 10  
No. 2, 40 @ 40 10

**Files.**  
Nicholson Mill Files, new list, dis 25 @ 25 10  
Bastard, dis 25 @ 25 10  
Taper, dis 25 @ 25 10  
Butcher's Mill, dis 25 @ 25 10  
Bastard, dis 25 @ 25 10  
Taper, dis 25 @ 25 10

**Fluting Machines.**  
Mrs Knox—14 in. roll, each \$3 00 net 10 @ 10 1/2  
Imperial—14 in. roll, each \$3 00 net 10 @ 10 1/2  
Crown—14 in. roll, each \$3 00 net 10 @ 10 1/2  
Eagle—14 in. roll, each \$3 00 net 10 @ 10 1/2  
Eagle—14 in. roll, each \$3 00 net 10 @ 10 1/2

**Hammers.**  
Yerkes & Plumb's, new list, dis 25 @ 25 10  
Hammond & Son's, dis 25 @ 25 10  
Yerkes, dis 25 @ 25 10

**Hatchets.**  
Beatty's, dis 25 @ 25 10  
Shingling and Half, No. 1, dis 25 @ 25 10  
Yerkes & Plumb's, dis 25 @ 25 10  
Shingling and Half, No. 1, dis 25 @ 25 10  
Claw, No. 1, dis 25 @ 25 10

**Hinges.**  
Strap and T, dis 60 @ 60 10  
**Horse Nails.**  
Nos. 5, 6, 7, 8, 9, 10  
Patman, dis 25 @ 25 10  
Ausable, Pointed, dis 25 @ 25 10  
Clinton Horse Nails, dis 25 @ 25 10  
Polished and Pointed, dis 25 @ 25 10  
Globe, dis 25 @ 25 10  
Discount on Ausable, Globe and Patman, dis 10 @ 10 1/2

**Knobs.**  
Rim and Mortise, dis 35 @ 35 1/2  
**Locks and Latches.**  
Door Locks, Rim and Mortise, dis 35 @ 35 1/2  
Tilt and Cupboard Locks, dis 35 @ 35 1/2  
American Padlocks, dis 35 @ 35 1/2  
Scandinavian Pad Locks, dis 35 @ 35 1/2  
No. 1, 35 @ 35 1/2  
No. 2, 35 @ 35 1/2  
United States Lock Co., dis 35 @ 35 1/2  
Trunk Locks, dis 35 @ 35 1/2

**Lanterns.**  
Lanterns—Sage Candle and Oil, dis 10 @ 10 1/2  
Kerosene, dis 10 @ 10 1/2  
Tubular Lanterns, dis 10 @ 10 1/2  
Long and Short Cutoff, dis 25 @ 25 1/2  
Pennsylvania Pattern, dis 25 @ 25 1/2

**Machines.**  
Enterprise Mfg. Co. Measuring Faucets, dis 20 @ 20 1/2  
Scribner's Gates, dis 20 @ 20 1/2  
Lincoln's, dis 20 @ 20 1/2  
Landers, Frary & Clark's Petroleum, dis 15 @ 15 1/2  
Taylor's Petroleum Faucets, dis 15 @ 15 1/2  
Brass Liqueur Cocks, dis 20 @ 20 1/2

**Ment Cutters.**—Dixon's, dis 25 @ 25 1/2  
Woodruff, dis 25 @ 25 1/2  
Saw, dis 25 @ 25 1/2  
Hale's, dis 25 @ 25 1/2  
Stuffers, dis 25 @ 25 1/2

**Planes.**  
Auburn Tool Co., Bench, dis 40 @ 40 1/2  
Second Quality, dis 40 @ 40 1/2  
Bailey Iron Planes, dis 40 @ 40 1/2  
Evans Pat. Circular, dis 40 @ 40 1/2

**Plane Irons.**—American, dis 10 @ 10 1/2  
Butcher's, dis 10 @ 10 1/2

**Plumbs and Levels.**  
Adjustable, dis 60 @ 60 10  
Non-Adjustable, dis 60 @ 60 10

**Picks.**—Philadelphia, dis 10 @ 10 1/2  
Pittsburgh, dis 10 @ 10 1/2

**Rails.**—Boxwood, dis 10 @ 10 1/2  
Ivory, dis 10 @ 10 1/2

**Rakes.**—Cast Steel Garden, dis 40 @ 40 1/2  
Malleable, dis 40 @ 40 1/2  
Wood Head Iron Teeth, dis 40 @ 40 1/2

**Steelevards.**—American Pattern, dis 20 @ 20 1/2  
No. 1, 20 @ 20 1/2  
No. 2, 20 @ 20 1/2  
No. 3, 20 @ 20 1/2  
No. 4, 20 @ 20 1/2  
No. 5, 20 @ 20 1/2  
No. 6, 20 @ 20 1/2  
No. 7, 20 @ 20 1/2  
No. 8, 20 @ 20 1/2  
No. 9, 20 @ 20 1/2  
No. 10, 20 @ 20 1/2

**Stuffers.**  
Golden Clipper, Damascus Blade, dis 20 @ 20 1/2  
Sharpened, dis 20 @ 20 1/2  
Clipper No. 5, Painted Red, Boxed and Sharpened, dis 20 @ 20 1/2  
Cast Steel Scythes, dis 20 @ 20 1/2  
German, dis 20 @ 20 1/2

**Saws.**—Steel and Iron, new list, dis 50 @ 50 1/2  
Dixton's Cross Cut No. 1, dis 50 @ 50 1/2  
Dixton's Cross Cut No. 2, dis 50 @ 50 1/2  
Dixton's Circular Saw, dis 50 @ 50 1/2  
Dixton's Hand Panel and Rip, dis 50 @ 50 1/2  
W. McNeice's H.V. Cross-Cut & Circle, new list, dis 50 @ 50 1/2  
Boynton's Lightning Cross-Cut, dis 50 @ 50 1/2  
Boynton One-Man Cross-Cut Saw, dis 50 @ 50 1/2

**Shovels and Spades.**  
Rowland's Plain Back, dis 45 @ 45 1/2  
Back Strip, dis 45 @ 45 1/2  
Extra discount on above for 10 days cash, dis 45 @ 45 1/2  
Oliver Ames & Sons, new list, dis 45 @ 45 1/2  
Set Irons—Richmond (pointed face), per 10, 35 @ 35 1/2  
Richmond (pointed face), by case, 10 @ 35 1/2  
Stone—Arkansas Oil, No. 1, dis 45 @ 45 1/2  
Turkey Oil, No. 1, dis 45 @ 45 1/2  
Wasita Extra, dis 45 @ 45 1/2  
No. 1, dis 45 @ 45 1/2  
Hindostan 8 inch, dis 45 @ 45 1/2  
Screws, dis 45 @ 45 1/2  
United States and others in Combination, dis 45 @ 45 1/2

**Spikes.**  
Plated, dis 40 @ 40 1/2  
Britannia, Boardman's (new list), dis 40 @ 40 1/2  
Parker's (old list), dis 40 @ 40 1/2  
German Silver, dis 40 @ 40 1/2  
Lalanc & Grosvenor Iron, dis 40 @ 40 1/2  
Springs, Gray's Door, by case, dis 3 1/2 @ 3 1/2  
Torry's Door, dis 3 1/2 @ 3 1/2

**Stocks and Dies.**  
Stocks Polish, Gen., \$ 25 @ 25 1/2  
Dixon, \$ 40 @ 40 1/2  
Trey Squares, Winterbottom, dis 20 @ 20 1/2  
Saw Rule and Level Co., dis 20 @ 20 1/2  
Whitely No. 2, dis 20 @ 20 1/2  
Tacks, &c., Half Weight Tacks, dis 20 @ 20 1/2  
Trunk, Clout and Finishing Nails, dis 20 @ 20 1/2

**Traps.**  
Genuine Chetla—Newhouse, dis 25 @ 25 1/2  
Im. Chetla—Newhouse list (1st out), dis 25 @ 25 1/2  
Vices, Solid Box, Trenton, \$ 12 @ 12 1/2  
Wrenches, Tons Common, dis 70 @ 75  
Patman Wrought Bar, dis 70 @ 75  
Malleable Bar, dis 70 @ 75  
Girard Wrenches, Coe's Pattern, dis 70 @ 75  
Wrought Bar, Coe's Pattern, \$ 30 @ 30 1/2  
Tatts Patent Wrought Bar, dis 70 @ 75  
Philadelphia Tool Co.'s Pat. Duplex, dis 70 @ 75  
Improved Baxter, dis 70 @ 75

**Wire.**  
No. 10 to 18, dis 25 @ 25 1/2  
No. 19 to 22, dis 25 @ 25 1/2  
Copper No. 10, dis 25 @ 25 1/2  
Copper No. 12, dis 25 @ 25 1/2  
Tinned Iron No. 10, dis 25 @ 25 1/2  
Galvanized Wire No. 10, dis 25 @ 25 1/2  
Novelty No. 2, dis 25 @ 25 1/2  
Universal, dis 25 @ 25 1/2

BUFFALO.

Reported by Messrs. Sidney Shepard & Co. May 28, 1877.

**Apple Parers.**—Bay State, per doz \$12 00  
Lull & Porter's, 7 50  
Peach Parers, 7 50  
Potato Parers, 12 00  
Himax Corer and Slicer, 12 00  
Bells, Cow—Yaw's genuine, 6 00  
Braces—Bitt, Spofford's Patent, dis 45 @ 50 1/2  
Brass—Cut, dis 45 @ 50 1/2  
Brass—Sheets, dis 45 @ 50 1/2  
Boards—Stove, Brooks' Pat. dis 35 @ 40 1/2  
Boards—Stove, dis 35 @ 40 1/2  
Brick—Bath (box of 2) dis 45 @ 50 1/2  
Can Openers—Surgens', dis 45 @ 50 1/2  
Cases—Farrar and Rod, dis 45 @ 50 1/2  
Chisels—Finner Sockets, dis 45 @ 50 1/2  
Framing Socket, dis 45 @ 50 1/2  
Corner socket Chisels, dis 45 @ 50 1/2  
Slick & Carpenters', dis 45 @ 50 1/2  
Castings—Malleable, dis 45 @ 50 1/2  
Cocks—Globe and Ribb, dis 45 @ 50 1/2  
Pattern—Meat, "Hale's", dis 45 @ 50 1/2  
Egg Beaters—"Dover", dis 45 @ 50 1/2  
Eggs—"Corrugated", per doz \$3 00  
Adjustable, dis 45 @ 50 1/2  
Columbus, dis 45 @ 50 1/2  
Files—Matchless Bros., dis 45 @ 50 1/2  
Fluters—Geneva Hand, dis 45 @ 50 1/2  
Freezers, Ice Cream—"Champion", dis 45 @ 50 1/2  
Hinges, Globe—Shepard & Co., dis 45 @ 50 1/2  
Hinges—Window Ring, dis 45 @ 50 1/2  
Shepard's and Standard, dis 45 @ 50 1/2  
House, Coal—Plain, Black and Galvan'd, new list, dis 15 @ 15 1/2  
Funnel, Black and Galvanized, dis 15 @ 15 1/2  
Fancy and Helmet, dis 15 @ 15 1/2  
Saw Irons, dis 15 @ 15 1/2  
Copper, "Hand Made", \$ 30 @ 30 1/2  
Enamelled, dis 30 @ 30 1/2  
Knives, Drawing—Appl. No. 1, dis 60 @ 60 1/2  
Razor Blade, dis 60 @ 60 1/2  
Lanterns, Tubular—with guard, dis 15 @ 15 1/2  
Without guard, dis 15 @ 15 1/2  
Mtns. Coffee—Box and Side, common, dis 15 @ 15 1/2  
Box Union and Eagle, dis 15 @ 15 1/2  
Cup Nails, "Chesapeake", dis 15 @ 15 1/2  
Horse, Ausable, No. 5, dis 15 @ 15 1/2  
"Pointed & Polished", add 1 c per lb.  
Paint—White Lead, U. S. Gov't, dis 5 @ 5 1/2  
Pans, Dripping, dis 5 @ 5 1/2  
Frying, dis 5 @ 5 1/2  
Rivets—Iron, Black and Tinned, dis 5 @ 5 1/2  
Screws—Iron, American screw Co., dis 10 @ 10 1/2  
Flat Head, Iron, dis 10 @ 10 1/2  
Flat Head, Brass, dis 10 @ 10 1/2  
Sieves—Wood, Hoop Iron, dis 10 @ 10 1/2  
Tinned, dis 10 @ 10 1/2  
Sifters—Ash, dis 10 @ 10 1/2  
Skates and Straps—White's, dis 10 @ 10 1/2  
Spoons, Iron, Tinned, by the case, dis 10 @ 10 1/2  
S. S. & Co. Kitchen, dis 10 @ 10 1/2  
Britannia, dis 10 @ 10 1/2  
G. S. Hall, Elton & Co., dis 10 @ 10 1/2  
Scales—Buffalo Scale Works, dis 10 @ 10 1/2  
Fairbanks, dis 10 @ 10 1/2  
Stove Polish—Gen., dis 10 @ 10 1/2  
Palace, dis 10 @ 10 1/2  
Rising Sun, dis 10 @ 10 1/2  
Squeezers—Lemon, Foreman, dis 10 @ 10 1/2  
Tins—Weight Ann., dis 10 @ 10 1/2  
Tins—Tins, dis 10 @ 10 1/2  
Thermometers—Tin Case, dis 10 @ 10 1/2  
Tools—Tins, dis 10 @ 10 1/2  
Vases—Palace Coal, dis 10 @ 10 1/2  
Vices, dis 10 @ 10 1/2  
Parallel, Buffalo, dis 10 @ 10 1/2  
Wire—Brass and Copper, dis 10 @ 10 1/2  
Wire—Bessemer Steel, dis 10 @ 10 1/2  
Writers—Novelty, dis 10 @ 10 1/2  
Tin Plates, Add for each X, dis 10 @ 10 1/2  
10x14, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x12, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x10, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x8, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x6, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x4, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x2, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/8, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/16, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/32, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/64, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/128, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/256, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/512, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1024, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2048, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4096, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/8192, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/16384, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/32768, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/65536, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/131072, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/262144, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/524288, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1048576, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2097152, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4194304, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/8388608, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/16777216, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/33554432, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/67108864, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/134217728, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/268435456, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/536870912, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1073741824, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2147483648, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4294967296, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/8589934592, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/17179869184, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/34359738368, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/68719476736, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/137438953472, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/274877906944, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/549755813888, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1099511627776, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2199023255552, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4398046511104, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/8796093022208, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/17592186044416, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/35184372088832, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/70368744177664, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/140737488355328, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/281474976710656, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/562949953421312, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1125899906842624, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2251799813685248, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4503599627370496, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/9007199254740992, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/18014398509481984, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/36028797018963968, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/72057594037927936, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/144115188075855872, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/288230376151711744, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/576460752303423488, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1152921504606846976, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2305843009213693952, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4611686018427387904, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/9223372036854775808, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/18446744073709551616, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/36893488147419103232, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/73786976294838206464, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/147573952589676412928, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/295147905179352825856, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/590295810358705651712, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1180591620717411303424, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2361183241434822606848, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4722366482869645213696, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/9444732965739290427392, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/18889465931478580854784, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/37778931862957161709568, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/75557863725914323419136, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/151115727451828646838272, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/302231454903657293676544, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/604462909807314587353088, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1208925819614629174706176, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2417851639229258349412352, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4835703278458516698824704, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/9671406556917033397649408, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/19342813113834066795298816, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/38685626227668133590597632, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/77371252455336267181195264, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/154742504910672534362390528, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/309485009821345068724781056, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/618970019642690137449562112, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/1237940039285380274899244224, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/2475880078570760549798488448, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/4951760157141521099596976896, 10, Charcoal, \$ 7 1/2 @ 7 1/2  
10x1/990352031428304219











## THE JUDSON GOVERNOR.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

### Reduced Price List, FEBRUARY 1, 1877.

For dimensions of Governor, see Illustrated Price List.

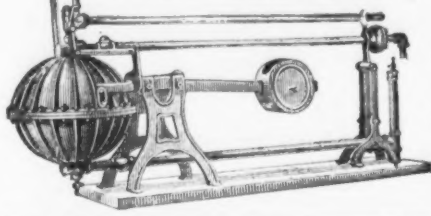


THE JUDSON PATENT Improved Steam Governor.

No Charge for Boxings & Cartage.  
JUNIUS JUDSON & SON, Rochester, N. Y.

Size, Inch.	Plain.	Bright Finish.	Extra Speed.	Stop Valve.
1	\$16.00	\$18.00	\$19.00	..
1 1/2	18.00	20.00	21.00	5.00
2	23.00	26.00	27.00	6.00
2 1/2	26.00	30.00	31.00	8.00
3	31.00	35.00	37.00	10.00
3 1/2	36.00	41.00	43.00	12.00
4	40.00	45.00	47.00	14.00
4 1/2	45.00	51.00	53.00	16.00
5	50.00	57.00	59.00	19.00
5 1/2	59.00	67.00	70.00	23.00
6	69.00	78.00	81.00	28.00
6 1/2	80.00	90.00	93.00	34.00
7	90.00	101.00	104.00	40.00
7 1/2	105.00	117.00	120.00	46.00
8	120.00	133.00	137.00	54.00
8 1/2	142.00	156.00	160.00	65.00
9	175.00	192.00	196.00	79.00
9 1/2	198.00	218.00	222.00	90.00
10	210.00	240.00	244.00	100.00

## The Albany Steam Trap.

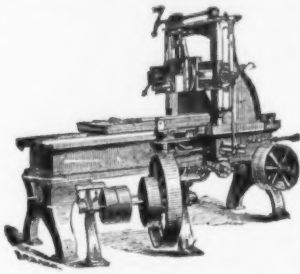


This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company,  
Albany, N. Y.

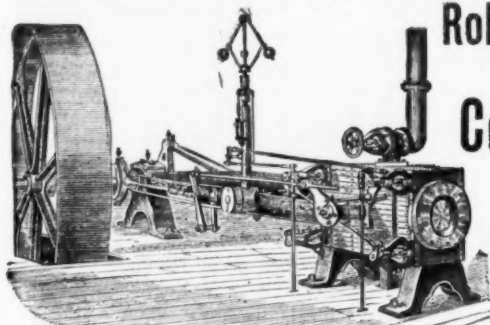
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Have constantly on hand and making



## Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.

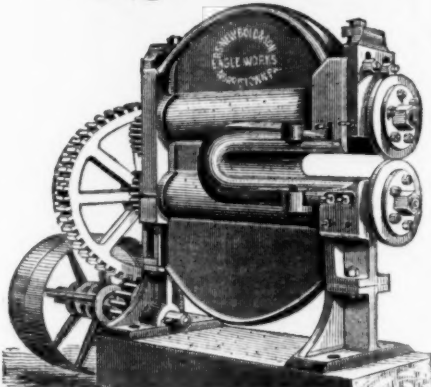


## Robt. Wetherill & Co CHESTER, PA.

### Corliss Engine

BUILDERS,  
Shafting & Gearing,  
Boiler Makers.

## R. S. NEWBOLD & SON, Eagle Works.



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IMPROVED ROTARY SHEARS,  
Rolling Mill, Blast Furnace, Flour Mill, Mining and Water Works Machinery. Air Compressors, Ore Washers and Brick Machines.

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H. A. Beale & Co., Parkersburg, Pa.  
Rolling Mill & Blast Furnace Plants & Engines.  
Merion Furnaces, Conshohocken, Pa.  
Aurora Furnace, Wrightsville, Pa.  
Clovespring Iron Works, New York.  
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MULTIPLE DRILLS. 2 to 30 Spindles.  
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HAND DRILLS. CAR BOX DRILLS.  
SPECIAL DRILLS. For Special Work.

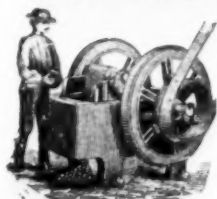


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SPECIALTIES.—Stone Cutters' Hammers and Tools, Quarrymen's Drills, Wedges and Half Rounds, &c., &c., &c. Miners' hammers and Tools, Blacksmiths' Hammers and Tools, Patent Hammers for picking burrs, &c. Also the common Mill Picks and Wood wedges Steel or Iron, 1/2 lb. Solid eye Picks, with one lb. of best Cast Steel inserted in each pick. The above goods are warranted inferior to none, both in quality and style of finish. All hammers have the eyes and polished faces, and are made from solid cast steel. No charge is made for boxing or crating at Augusta; shipping facilities are excellent. Hammers made to any pattern or drawing. Capacity of works, one ton of hammers per day. A full line of the above goods constantly in stock. Catalogue on application.

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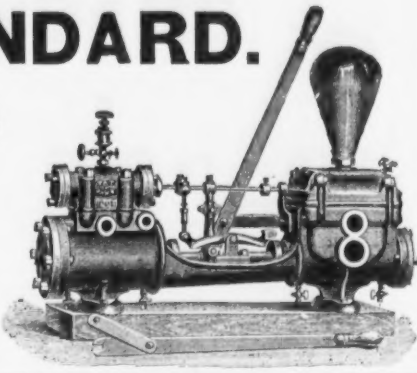
IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.  
Also for crushing Quartz, Flint, Emery, Corundum, Feldspar, Conch. Barites, Manganese, Phosphate Rock, Plaster, Soapstone, &c.  
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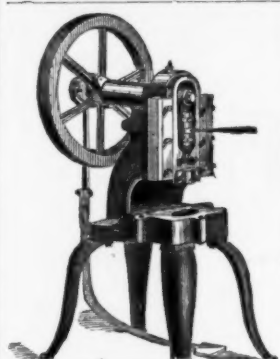
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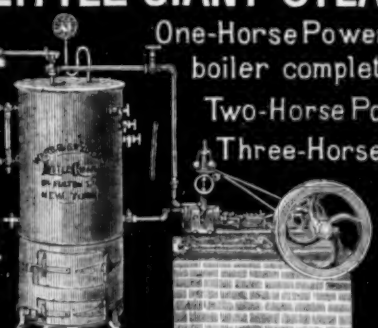
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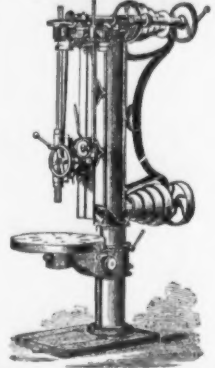
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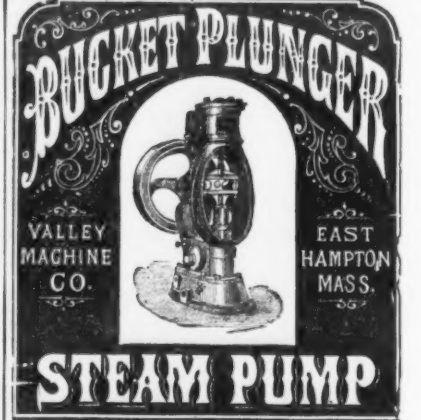
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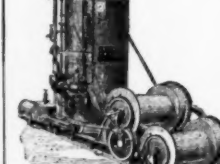
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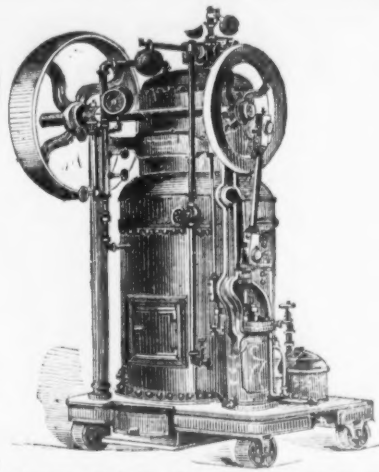
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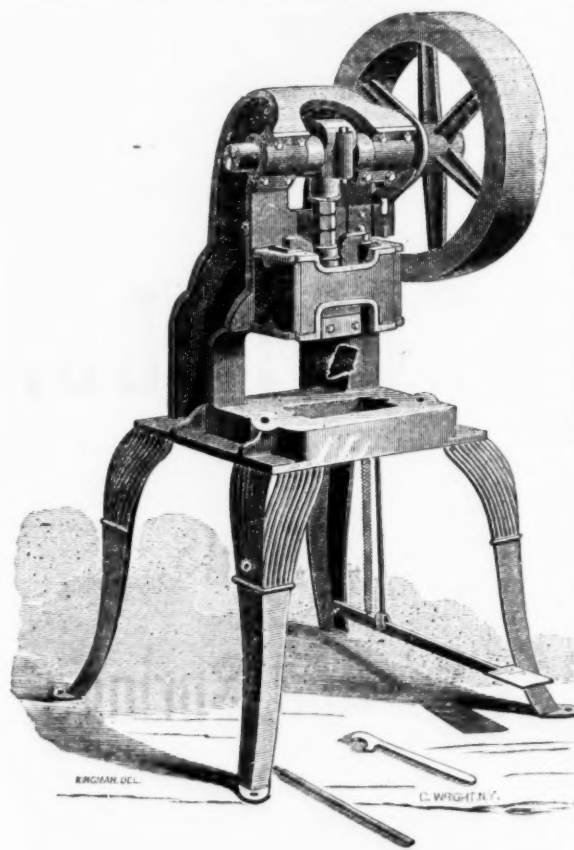
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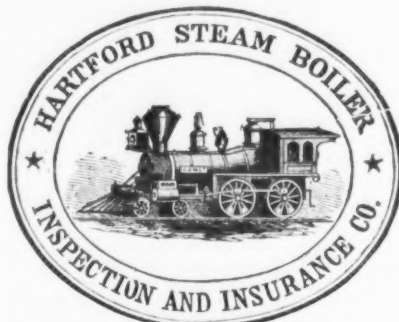
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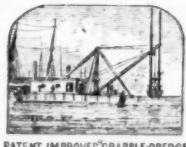
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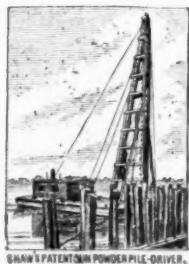
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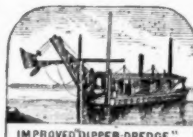
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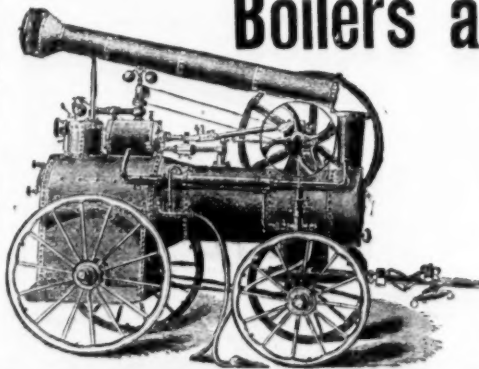
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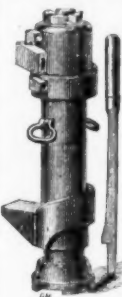
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For  
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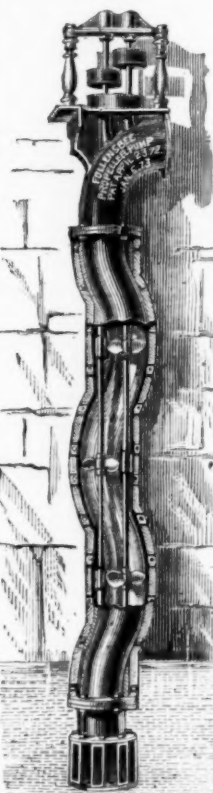
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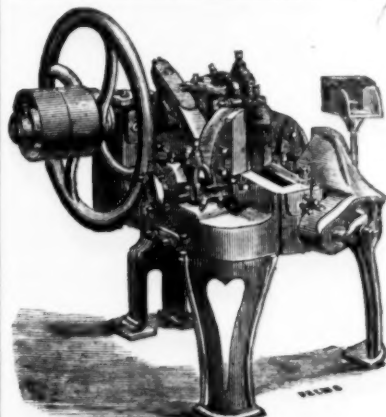
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XXX Genuine.....	17c
XX.....	14c
X.....	12c
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B.....	8c

Note.—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

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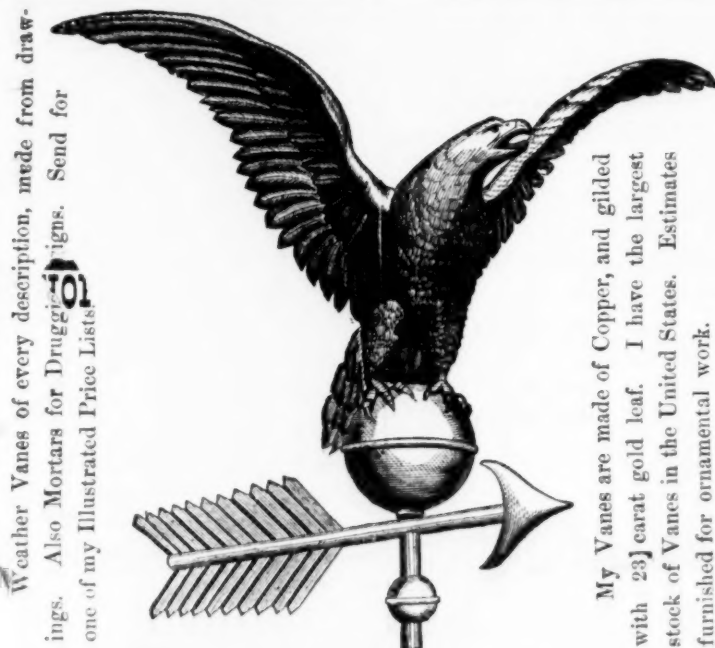
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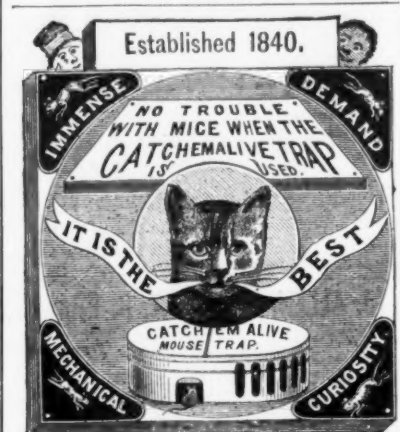
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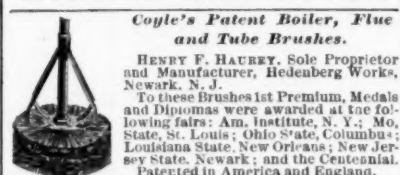


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